ELECTRICAL SOUTH

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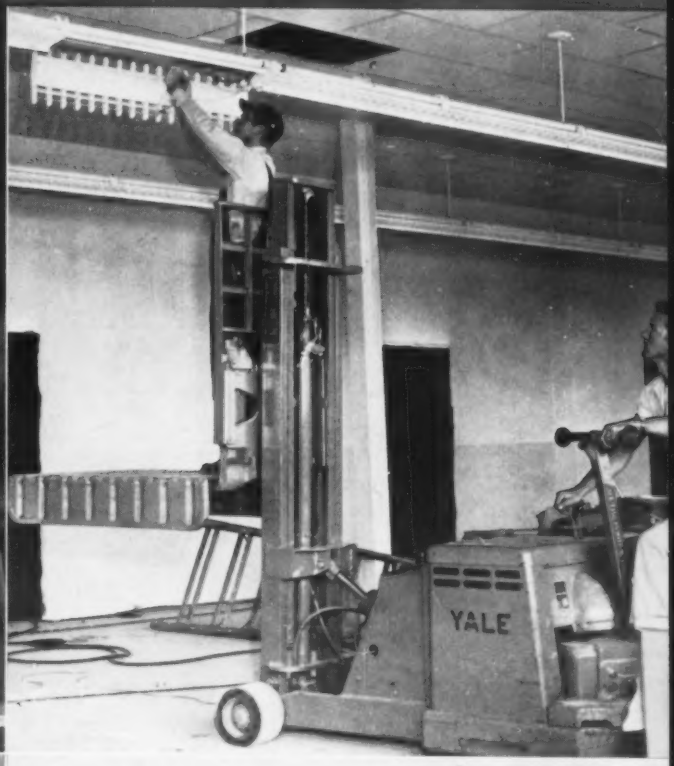
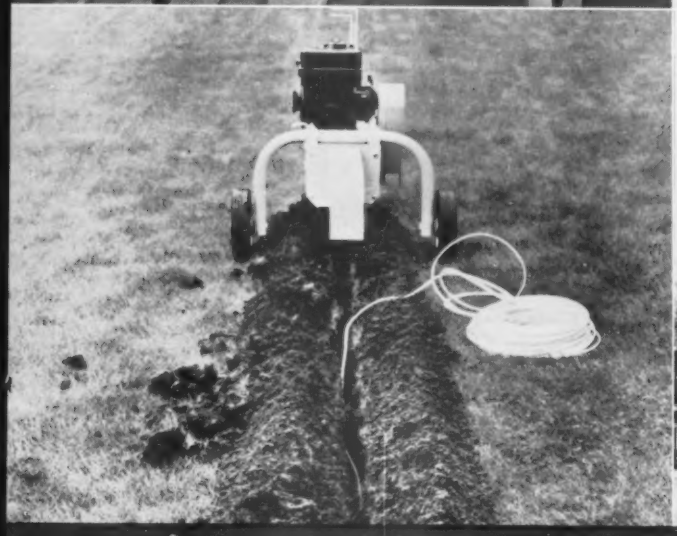
How to use the National Electrical Code—a new series begins on page 44

DECEMBER 1957

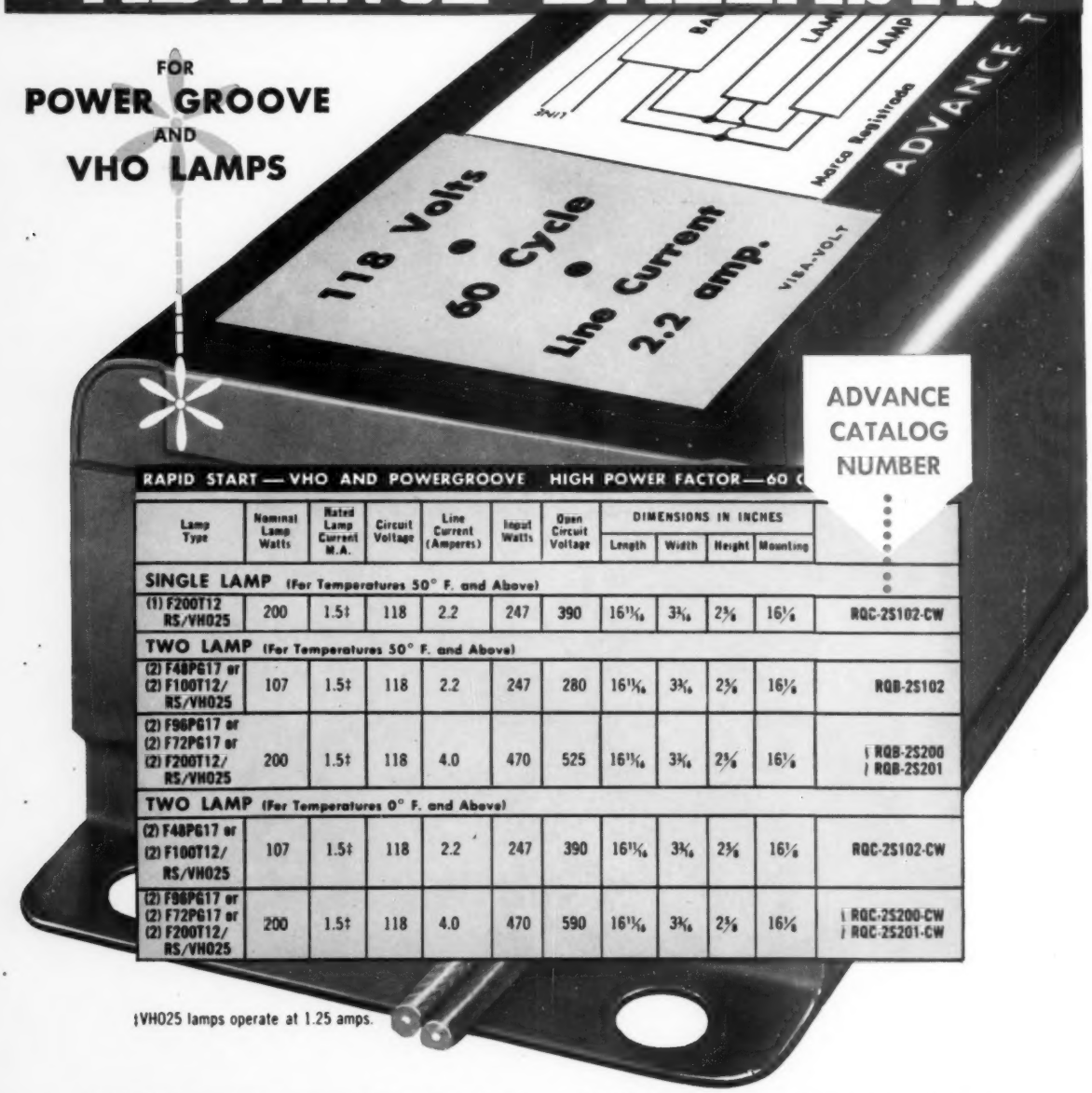




The efficient use of time-saving tools and equipment is often the deciding factor between profit and loss in an electrical contractor's operations. Here are a few examples of tools and equipment that are being used advantageously

ADVANCE BALLASTS

FOR
POWER GROOVE
AND
VHO LAMPS



ADVANCE CATALOG NUMBER

RAPID START — VHO AND POWERGROOVE HIGH POWER FACTOR—60 C

Lamp Type	Nominal Lamp Watts	Rated Lamp Current M.A.	Circuit Voltage	Line Current (Amperes)	Input Watts	Open Circuit Voltage	DIMENSIONS IN INCHES Length	Width	Height	Mounting	
SINGLE LAMP (For Temperatures 50° F. and Above)											
(1) F200T12 RS/VH025	200	1.5‡	118	2.2	247	390	16 11/16	3 1/16	2 5/8	16 1/8	RQC-2S102-CW
TWO LAMP (For Temperatures 50° F. and Above)											
(2) F48PG17 or (2) F100T12/ RS/VH025	107	1.5‡	118	2.2	247	280	16 11/16	3 1/16	2 5/8	16 1/8	RQB-2S102
(2) F96PG17 or (2) F72PG17 or (2) F200T12/ RS/VH025	200	1.5‡	118	4.0	470	525	16 11/16	3 1/16	2 5/8	16 1/8	RQB-2S200 / RQB-2S201
TWO LAMP (For Temperatures 0° F. and Above)											
(2) F48PG17 or (2) F100T12/ RS/VH025	107	1.5‡	118	2.2	247	390	16 11/16	3 1/16	2 5/8	16 1/8	RQC-2S102-CW
(2) F96PG17 or (2) F72PG17 or (2) F200T12/ RS/VH025	200	1.5‡	118	4.0	470	590	16 11/16	3 1/16	2 5/8	16 1/8	RQC-2S200-CW / RQC-2S201-CW

‡VH025 lamps operate at 1.25 amps.

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Volume 37 **Number 12**

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Built to last a house time

Economic comment

by J. Whitney Bunting, Ph.D.

Contributing Economics Editor

Normalcy of economic affairs

The present softening of economic conditions in a wide variety of business pursuits does not appear to be a signal for alarm. This is true not merely because of the endless claims of business and governmental leaders that all is well, but because of the very nature of economics itself.

Economic life must of nature be a dynamic situation with a great deal of change built into any business activity. This means that there must be periods of upward or downward movement of varying degrees of intensity. The problem of today is that the nation has been acclimated to "one-way dynamics" only; that is the upward trend of activity. Any change or deviation from this pattern is immediately viewed with fear and alarm. The alarm becomes intensified the farther a person is away from a clear understanding of what is taking place in the economic world.

For almost two decades now, the economic and business system has been under the influence of strong upward-tending forces that have artificially stimulated business activity. Such factors as the ending of a prolonged depression, two hot wars, and the continuous pressure of a seemingly endless cold war, have made for highly inflaitonary times.

Not only has normal demand been present, influenced by prosperous payrolls, but the nation has lived in an era of heavy defense spending, thus having an artificial competitor always available at the market place.

Under normal conditions, each war is usually followed by some type of recession period in which the war economy gives way to the regular civilian peacetime business activity. Even this has not been allowed to happen by nature of the events that have continuously disturbed this nation since 1946. On the whole, this condition has been good for the people for it has made living bountiful but costly, with few economic clouds on the horizon.

One the other hand, however, it has guided popular thought along the lines that business should always be upward with no downturns whatsoever. It is this unrealistic philosophy that many people have that has caused the popular alarm that is beginning to be heard.

Depressions can occur

One should never get into the position where a bold statement is made that a "depression can never again be felt in America." This would be an announcement fraught with danger because it would fly in the face of all history and could not be proven with adequate reasoning.

Rather it might be said that when and if a depression does occur, the nation now has more tools and knowledge with which to attack such a condition. This would certainly limit the strength and the length of such a downturn if it should occur.

Moreover, since the political life of either major party today would be seriously affected by an economic downturn, the nation can be assured that the lawmakers will do all in their power to call upon all depression-fighting resources to overcome any prolonged trend of a recession nature. This lends credence to the belief that a severe depression, such as 1929-39, will probably not happen again.

However, one should not forget that, for the economy as a whole, some readjustments of an immediately unhappy nature, may have long-run beneficial effects. For example, the long term increase in wages, costs and other economic factors has brought such items to extremely high plateaus for the most part.

A continued increase in wages (and consequent increases in costs of production) would necessarily increase the precarious nature of business activity. It is entirely unrealistic to assume that these items could continue to rise unchecked without some very bad effects upon the economic system.

The only way increased wages can be justified, for example, is by increased production. Of late, all wage increases have not been aligned with increases in production and so, therefore, they are dangerous and economically unwarranted. The result must of necessity be some form of readjustment in the economic scene.

Declining profits

Those who follow the affairs of corporations, large and small, have been struck in recent months by the decline of profits while sales volume has been increasing by astronomical leaps. This is the most serious danger signal of all.

The life of a corporation must be based upon a normal flow of profits with which the firm may provide incentives to investors and also to handle some forms of expansion, new construction, and the like. No one factor of production can long tap the profits of industry for itself and leave the remaining factors on a "poor relation" basis. Yet, this is just what is happening today.

The heavy increase in wage and salary costs without consequent increases in productivity has caused industry to see a continuing squeeze upon profits until the situation has become increasingly serious.

This trend, if it continues, will cause some companies, particularly smaller ones with more limited resources, to go out of business. This will cause a certain amount of unemployment which in itself will prolong and intensify the readjustment. A start in this direction will force intensive efforts by both

(Continued on page 109)

Dr. Bunting is a well-known economist and educator having special knowledge of the South.

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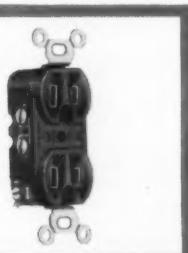
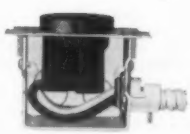
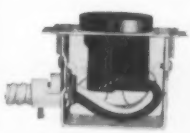


No. 5242, 5262 grounding duplex outlets.

No. 6142 duplex outlet.



No. 9303 three-wire polarized connector.



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NISA, Southeastern Chapter. Mrs. Virginia Oehmann, Executive Secretary, 19 N. W. Fifth St., Fort Lauderdale, Fla.

NISA, Electric Motor Service Association of the District of Columbia. John W. Lainhart, Secretary, 913 E. St., NW, Washington 4, D. C.

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NISA, Southwestern Chapter. George Foshee, Secretary, 203 S. Main, Fort Worth 4, Tex.

NISA, Electric Club of West Virginia. O. E. Jenkins, Secretary c/o Guyan Machine Co., Logan, W. Va.

YOUNGSTOWN "BUCKEYE" CONDUIT

. . . protects wiring system of Cleveland's new $5 million air terminal

Highly functional—yet strikingly impressive, describes the new Terminal Building at Cleveland's Hopkins Airport. It's part of an $8 million improvement program that will restore Cleveland's position of national prominence in the air transportation industry.

Planners of the airport's revitalization project wisely specified Youngstown's "Buckeye" Full-Weight Rigid Steel Conduit for life-time protection of the Terminal's all-important electrical wiring system. Electrical systems that fail to function properly are definitely a bad investment.

To keep your electrical systems functioning properly, specify quality-controlled Youngstown "Buckeye" Conduit. Satisfied users tell us, "It's easier to bend and thread — easier and faster to fish wires through, and due to its superior corrosion-resistance, gives a much longer, trouble-free service life."

"Buckeye" Conduit is the specification of many leading building owners, architects and contractors—why not make it yours, now?

Leading distributors in the industrial and electrical markets carry complete and ample stocks for on-the-spot delivery to your job sites. They're awaiting your phone call—today.

Cleveland Hopkins Airport; Cleveland, Ohio
Architects: Outcalt, Guenther & Associates, Cleveland, Ohio
Electrical Contractor: Polacek Electric Co., Cleveland, Ohio
Conduit Supplier: Westinghouse Electric Supply Co., Cleveland, Ohio

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
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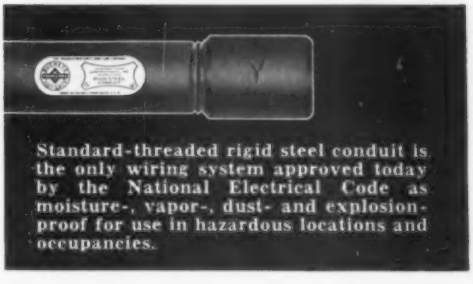

Standard-threaded rigid steel conduit is the only wiring system approved today by the National Electrical Code as moisture-, vapor-, dust- and explosion-proof for use in hazardous locations and occupancies.

CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

1086—Cable Connectors
Tomic Sales and Engineering Co., 4864 Woodward Ave., Detroit 1, Mich., now have available catalog sheets containing data on the complete line of their connectors, couplings, and cable connectors.

1088—Fittings and Fixtures
A 32-page illustrated catalog covering Killark fittings and fixtures is offered by Killark Electric Mfg Co., Vandeventer and Easton Aves., St. Louis 13, Mo.

1092—Electrical Boxes
Steel City Electric Co., 1207 Columbus Ave., Pittsburgh 12, Pa., offers a catalog of their complete line.

1130—Conduit Fittings
The latest completely illustrative catalog on their diversified line of conduit fittings is announced by the Atlantic Conduit Fittings Co., 450 Western Ave., Boston 35, Mass.

1136—Space Heating Guide
Cavalier Corp., Chattanooga 2, Tenn., has prepared a Guide for Calculations on Electric Space Heating. It is based on study of several thousand installations of electric heat and is a handy reference for calculating electric heating requirements and estimating operating costs. The booklet contains discussion, charts, and floor plan examples.

1150—Fluorescent Fixtures
A ninety-six page catalog, "Engineered Lighting," is being offered by Wm. Penn, 1429 South 23rd St., Philadelphia 46, Pa. Specifications and applications are described for interior illumination from 10 to 750 foot candle levels.

1166—Electrical Fittings
A 40-page illustrated catalog and price list on the Gedney line. Shown and listed are conduit, threaded entrance, SEC, EMT and ground fittings, and box connectors for both armored and non-metallic cables. Copies are available from Gedney Electric Co., RKO Bldg., Radio City, New York 20, N. Y.

1184—Approved RHW Wire
Bulletin No. 1018 describing first Underwriters' Approved Type RHW Wire, developed to meet the new National Electrical Code standards, is available from Simplex Wire and Cable Co., 79 Sidney St., Cambridge 39, Mass.

1190—Electrical Fittings
Blackhawk Industries, Dubuque, Iowa, offers a complete catalog of electrical conduit and cable fittings. Also a special publication giving detail drawings and instructions for installing service entrance masts on low or ranch type buildings.

1192—Wire Pulling Lubricant
Illustrated six-page folder showing the advantages of an improved Y-Er Eas wire pulling lubricant is available from Electro Compound Co., 3812 150th St., Cleveland 11, Ohio.

1214—General Catalog
General catalog of Royal Electric Corporation, Pawtucket, R. I. covering flexible, service and lamp cords, cord sets, extensions, trouble lights, wiring devices and fuses is available to wholesalers. Dealer catalogs may be secured from Royal distributors.

1218—Carbon Products
A 28-page catalog on Motor and Generator Brushes and carbon products telling how to order brushes, grade recommendations, characteristics, and description of brush grades, is available from the Helwig Co., 2536 North 30th St., Milwaukee, Wis.

1220—Stadium Lighting
The Pyle-National Co., 1334 N. Kostner Ave., Chicago, Ill., announces the availability of a new eight-page bulletin, No. 605, on stadium lighting, describing in detail floodlighting of a typical outdoor athletic arena stressing the importance of using fully enclosed floodlights.

1224—Electrical Equipment
The Wadsworth Electric Mfg. Co., Inc., Covington, Ky., has issued a new catalog Con 15-0 and Bulletin W. C. B. 53-1, containing data on their lines of Safety Switches, Service Equipment, Distribution Panels and "E-Z-RED" Circuit Breakers.

1230—Compression Connectors
An illustrated 18-page bulletin (13A) describes Squeezon compression connectors for all overhead distribution connections from line wire to ground rod. Offered by James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo., the bulletin also describes the mechanical and hydraulic installation tools required and tells where to use each.

ELECTRICAL SOUTH
806 Peachtree St., NE
Atlanta 8, Ga.

December, 1957

Gentlemen:

Please send me the bulletins and catalogs indicated.
(Print Plainly)

name ..... Title .....

Company .....

Address .....

City & State .....

Circle numbers below. Bulletins and catalogs will be mailed promptly.

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1214	1218	1220	1224	1230
1238	1240	1244	1248	1250
1254	1262	1266	1268	1280
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1312	1314			

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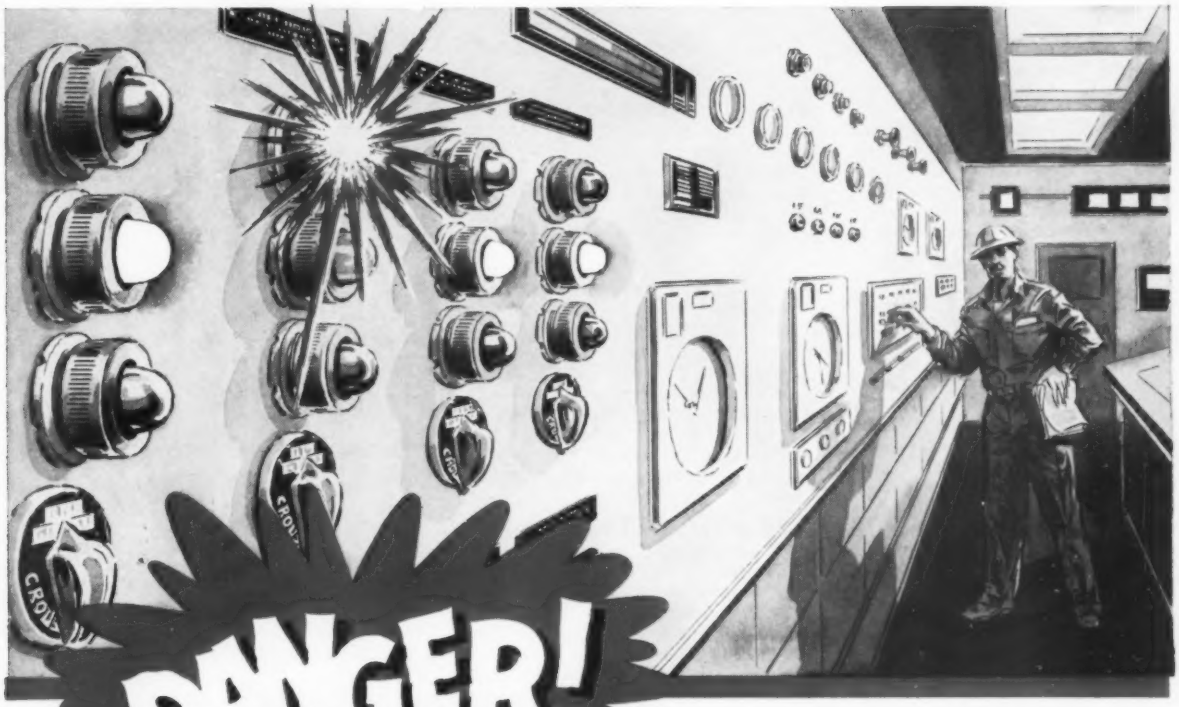
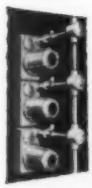


. . . instantly signaled by Crouse-Hinds *Visularms*®



Condulet Visularms

Condulet Horns, Bells & Sirens

Condulet Pilot Lights

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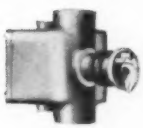

Condulet Selector Switches

In oil refineries, chemical plants, synthetic rubber plants — wherever constant watch of processing is necessary — Crouse-Hinds Condulet® *Visularms* provide visual indication of process conditions, and instant control of manufacturing equipment.

By means of pilot lights (and bell, horn or siren signals where desired) *Visularm* indicates normal or abnormal temperature, liquid level, pressure, or other conditions which can be electrically coupled to the circuit.

Explosion-proof or dust-tight and weather-resistant construction* assures maximum safety in hazardous locations. Compact designs minimize space required on control or panel boards . . . are easy to install.

A Visularm system delivers substantial savings by eliminating the necessity for buying individual components . . . housing them . . . and wiring your own system completely.

Two- or three-light styles may be mounted either vertically or horizontally. For audio warning, any number of *Visularms* may be used to operate a single horn, bell or siren.

Visularms are just one of hundreds of items in process control board equipment offered by Crouse-Hinds. Only a few are shown at left. For full information on the complete line, call your nearest Crouse-Hinds distributor, or write . . .

*Dust-ignition-proof.

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1238—Selecting Fuses

A 12-page descriptive handbook "Fuseology" tells how to get safest most dependable, trouble-free electrical protection from fuses. Contains useful information on selecting right size and type of fuses—how to stop needless blows—avoiding poor contact and other troubles. Issued by Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo.

1240—Lighting Fixtures

Prescolite Manufacturing Corp., 2229 Fourth St., Berkeley 10, Calif., now has available a 20 page color catalog, No. 31-F, describing their complete line of lighting fixtures including recessed series and accessories, surface series and accessories, exit light, and aisle lights. A typical installation and dimensional drawing are shown for each fixture.

1244—New Electrical Fittings Catalog

Concise 36-page catalog illustrates and describes a complete line of electrical fittings, cable racks and wiring specialties. The catalog contains many detail drawings, clear-cut photographic illustrations of mast fittings, cable connectors, straps, hangers and ground clamps in a wide variety of types and sizes. For your free copy, write The M. & W. Electric Mfg. Co., East Palestine, Ohio.

1248—Conductor Armor

A new catalog of Superformed Armor Rods, Lineguards, Patch Rods, and Tap Armor describing various uses and applications of these products on overhead conductors is offered by The Fanner Manufacturing Company, Brookside Park, Cleveland 9, Ohio.

1250—Electrical Enclosures

Catalog No. 5354 currently being offered to the trade by B & C Metal Stamping Co., 590 Means St., N. W., Atlanta, Ga., is a well-organized, 66-page manual giving complete descriptive information, prices, and specifications on all items in the B & C line of electrical enclosures. Copies are available free of charge to electrical contractors.

1254—Construction Anchors

"Anchoring for Power and Communication Lines," a completely illustrated manual on improving line construction with better anchoring, has been published by the Advertising Dept., the A. B. Chance Co., Centralia, Mo. The 25-page booklet shows how to install the right anchor at the right place in the right way.

1262—Fluorescent Fixtures

The new loose-leaf catalog recently issued by Southern Lighting Manufacturing Co., 501 Elwell St., Orlando, Fla., contains complete diagrams, specifications, and descriptions for all fluorescent fixtures which they manufacture. In addition to the information on commercial, industrial and school fixtures, the catalog also lists hangers, troffers, troffer accessories, and incandescents which are available from the firm.

Enter Code Numbers of Catalogs Desired on Coupon on Page 8

1300—Lighting Control Switch

The Arrow-Hart and Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn., offers a one page information sheet on their new quiet, tap action, lighting control switch, designed to fit any standard toggle wall plate.

1302—F. Lamp Maintenance

An informative folder on Fluorescent Lamp Trouble Shooting is offered by Champion Lamp Works, Lynn, Mass. It features an illustrated trouble shooting check chart. The Champion Lamp Works also has available a helpful slide rule on lamp application, covering incandescent, regular fluorescent, and slimline lamps.

1304—Portable Trench Digger

Stampings Inc., 1017 Mound St., Davenport, Iowa, offers a four page information sheet about the Pow-R-Spade portable trench digger. It was designed to be controlled and handled by one man and digs a neat three-inch wide trench to any depth up to 24 inches.

1306—Fasco Fans

Fasco Industries, Inc., North Union and Augusta Sts., Rochester 2, N. Y., offers a thirty page catalog describing their line of window fans, oscillating fans, hassock fans, kitchen ventilating fans, and range hoods.

1308—Cable Spinners

A complete data file on aerial cable spinners and tools is available from Cable Spinning Equipment Co., 3100 Topeka Blvd., Topeka, Kansas. The file includes reprints of pertinent articles, operating instruction book, and price list.

1310—Vinyl Plastic Tapes

Three booklets just issued describe Dutch Brand vinyl plastic tapes available for a variety of applications. Plastic tapes in colors, pressure sensitive strapping tape, and Trantex Tape designed especially for protection against corrosion are among those manufactured by Dutch Brand Division, Johns-Manville, 7800 So. Woodlawn Ave., Chicago 19, Ill.

1312—Killark Fittings

A new catalog section covers Killark plugs and receptacles in two basic designs: explosion-proof and weatherproof. This new line offers many advantageous features, and is available in many styles and sizes to fit various boxes. Killark Electric Mfg. Co., Easton and Vandeventer Ave., St. Louis, Mo.

1314—Wiring Equipment

Keystone Manufacturing Co., 23328 Sherwood Road, Center Line, Mich., has issued a new catalog (No. 157-A) giving complete specifications and illustrations on their line of wiring installation equipment. Included in the 70 page catalog are wireway and auxiliary fittings, cutout boxes, outlet boxes, switch boxes, and cabinets, giving Code requirements, and price sheets.

DGD Bolted Dead-End Clamp

The DGD Bolted Distribution Dead-End is specially designed for light duty pole and house service drops. Eleven inch bale is compressed into the body of the clamp which includes a "wave seat" to provide added holding power. One piece clamp design assures quick, easy installation. Cable sizes from #8–1/0ACSR.

ANDERSON ELECTRIC CORPORATION
Birmingham 1, Alabama
Export Representative: International Standard Electric Corp.

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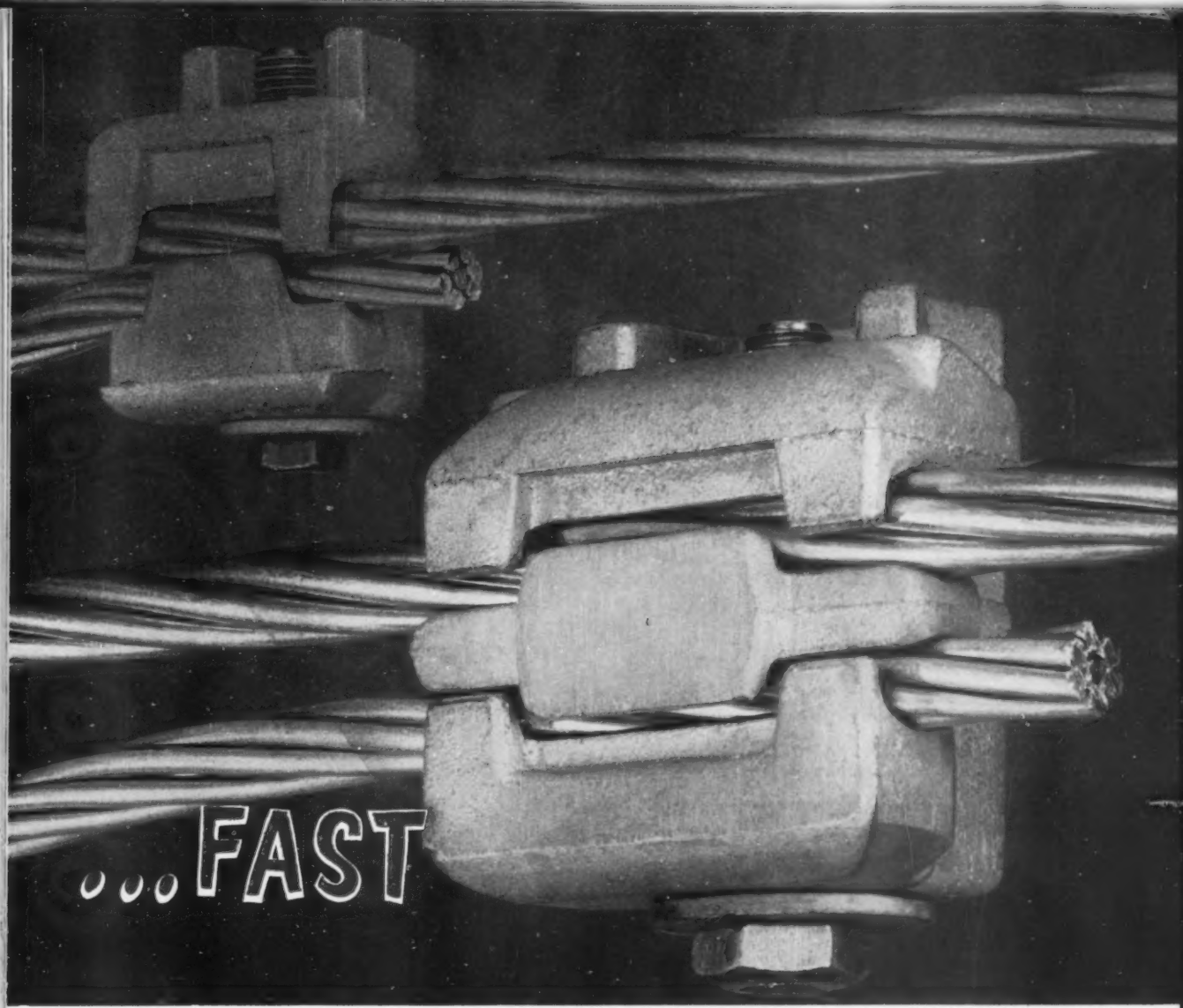

DGA SERIES: SEVEN SIZES: #8 SOLID — 397.5 MCM ACSR (18/1)

One Piece Construction: Makes for fast installation. Just hook on the Main, insert Tap and tighten!

High Conductivity Spacer: Anderson's soft, pure, aluminum Cover-All Spacer assures additional contact with individual strands. Spacer design material and massive construction combine to provide cool running, long-life contacts.

Extended Spacer for Easy Application: Whether applying the DGA on "hot" or "dead," the Spacer can easily be picked up for Tap insertion.

Positive Interlocked Upper and Lower Grooves: Main and Tap groove alignment is maintained by interlocked casting bodies, thus aiding installation and improving contact efficiency.

Pre-Inhibited: All DGA connectors with spacers are chemically cleaned and inhibited at the factory. Contact resistance is greatly reduced and maintained by Anderson's exclusive inhibitor coating process. Gives corrosion protection without surface greasiness or tackiness.

Kleen-Seel: At slightly additional cost all DGA connectors will be delivered with grooves inhibitor-packed and the connectors sealed in polyethylene bags.

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Research / Quality / Performance / in Aluminum and Bronze Products

Aluminum and Bronze Power Connectors • Clamps • Fittings • Accessories for SUBSTATION • TRANSMISSION • DISTRIBUTION

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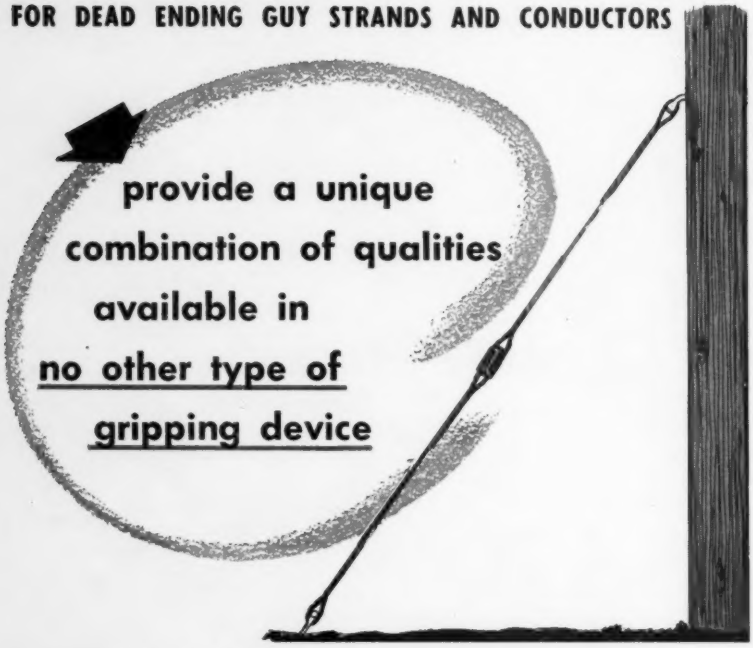
FOR DEAD ENDING GUY STRANDS AND CONDUCTORS



FANNGRIPS are made of highest grade spring-type wire by Fanner's exclusive roll-forming process. They provide a permanent and positive grip, and, because the frictional force is greater than the strand strength, FANNGRIPS cannot slip!

- Provide maximum load strengths — eliminate variables in application.
- Apply in a minimum of time — eliminate laborious field fabrication.
- Permanently tight, self-clamping — no movement or relaxation due to load reversal.
- Corrosion resisting.
- May be removed and reapplied when necessary.
- Do not damage surface of strands.
- Neat application without bulk — no dangerous or wasteful ends.
- Available in electro galvanized steel, copperweld or aluminum alloy.

No other dead-ending method matches FANNGRIPS economy!

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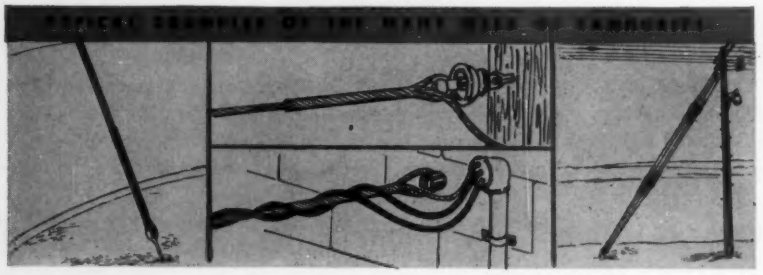

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PLASTIC INSULATING TUBINGS AND MOLDINGS

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1266—Metal-Clad Switchgear

Detailed information on metal-clad switchgear is now available in two special bulletins, 700-B and 7004-C. These booklets give descriptions, application data and specifications on units up to 15 kv and 500,000 kva interrupting capacity. Wire I-T-E Circuit Breaker Co., 19th and Hamilton St., Philadelphia 30, Pa.

1268—Lighting Fixtures

The Perfeclite Co., 1457 East 40th Street, Cleveland 3, Ohio, makes available the following literature: (1) Data Folder 54-B—4 pages of engineering information, prices and specifications on Plastic Indirect Concentric Ring Luminaires. (2) Data Folder EX-55-A—10 pages of information on Exit Units for all building locations. Complete engineering data and prices given. (3) Data Folder 56-A—information on Ceiling Pan Fixtures and Vapor Proof Prismatic Exterior Fixtures.

1280—Electric Heating

Electromode Division of Commercial Controls Corp., 45 Crouch St., Rochester, N. Y., has issued a new catalog listing their complete line of electric heaters, including bathroom, wall-type, portable, baseboard heating, radiant heating panels, various industrial units, and combinations. Also included in Catalog No. 31-K-3 are complete specifications and price list.

1282—Exit Lights

A four-page catalog providing illustrations and specifications for their complete line of exit lights has been released by Curtis Lighting Co., 6135 W. 65th St., Chicago 38, Ill. Types of mountings illustrated include recessed, end to wall, ceiling, direct wall, and pendant.

1284—Electric Radiant Heating

The design and installation of electric radiant heating is covered comprehensively in two publications just released by General Electric Co., 95 Hathaway St., Providence 7, R. I. Designers of heating systems will find valuable information in a 24-page Electric Radiant Heating Design Manual. A 36-page manual explains and illustrates how to install G-E Electric Radiant Heating in homes.

1288—Electric Ventilators

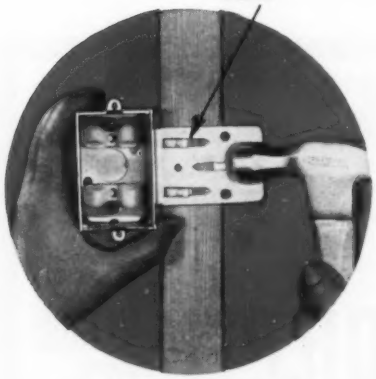
An illustrative 8-page folder, Bulletin 620-L, showing typical installations of a complete line of ventilators for wall, ceiling, laundry, bathroom, kitchen, and small rooms, is available from TradeWind Motorfans Inc., 7755 Paramount Blvd., Rivera, Calif.

The folder includes dimensional drawings of installations helpful to building and electrical contractors.

1298—Electrical Fittings

The Electrical Fittings Corp. of Woodside, New York (EFCOR) offers a complete catalog covering all types of fittings for all types of raceways and conductors. The catalog also features an extremely comprehensive "What Goes Into What" section covering 5 pages alone.

APPLETON announces another First!



There are holes at end of bracket for the rare occasion when switch box must be set on studding at full length of bracket.

Here is the industry's first Underwriters' approved Switch Box which requires *no nails* to mount! The notched prongs are simply hammered into the wood and the "EAGLE CLAW" bracket locks the box to the studding. As prongs enter the wood, they curve away from each other . . . can't possibly work loose! Due to special compensating angle of bracket, box always rests at true 90° angle after prongs are hammered in. Feature for feature, nothing touches these new, money saving **APPLETON "EAGLE CLAW" Switch Boxes.** Specify them on your next order!

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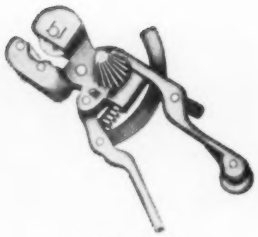
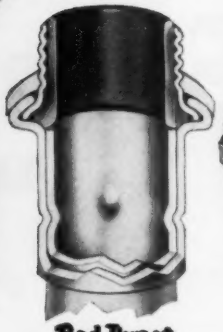
the original concrete-tight **INDENTER FITTINGS** *for E.M.T.*

Red Throat
Insulated Connector



"BM" #100
Cutter for ½, ¾ and 1" E.M.T.



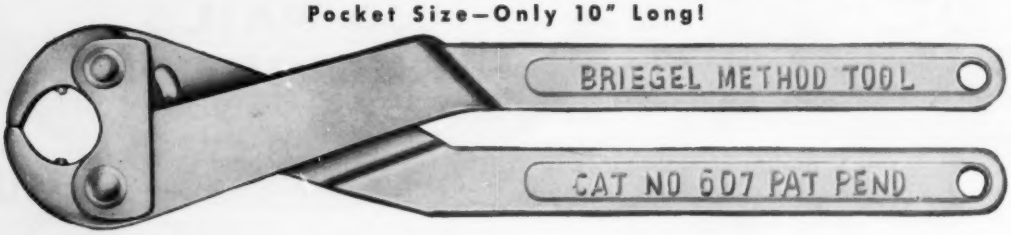
Red Throat
Cross section

"BM" #1000
Holder for ½, ¾ and 1" E.M.T.

"BM" #600
Changeable Jaw Indenter

THE NEW BM607 INDENTER FOR ½" FITTINGS

Pocket Size—Only 10" Long!



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Phone: Hamilton 8-7388

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All B-M Indenter Fittings are U.L. Approved as concrete-tight and all Compression Fittings as rain-tight as well as for general use (File Card E10863). Also comply With Federal Specifications W-F-406.

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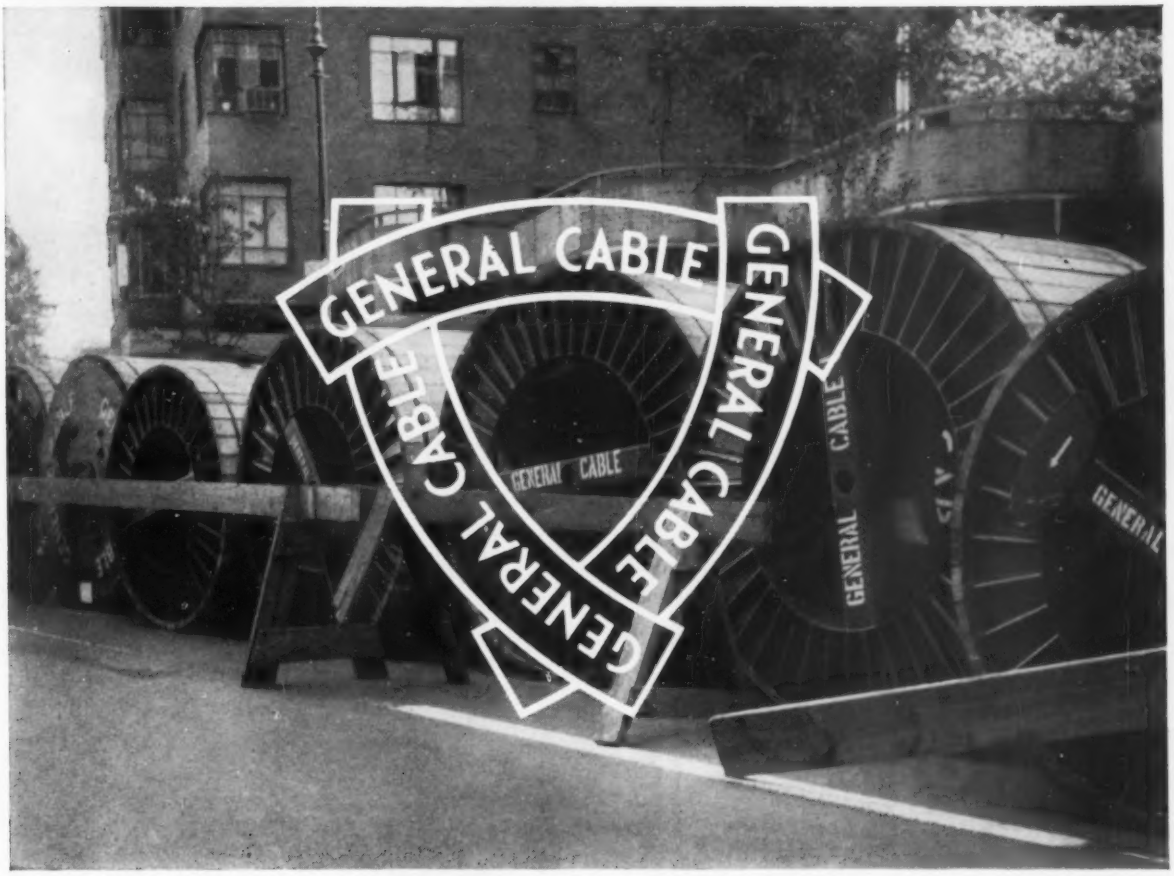

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AVAILABILITY: Immediate delivery everywhere, through over 500 Authorized Distributors, backed up by complete inventories of wire and cable in all the General Cable Distributing Centers.

SERVICE: Experienced and trained representatives and engineers to help you on the job.

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General Cable backs you up on the job with the *three things you need* to make it easier for you and to keep your jobs on schedule . . . the finest service anywhere.

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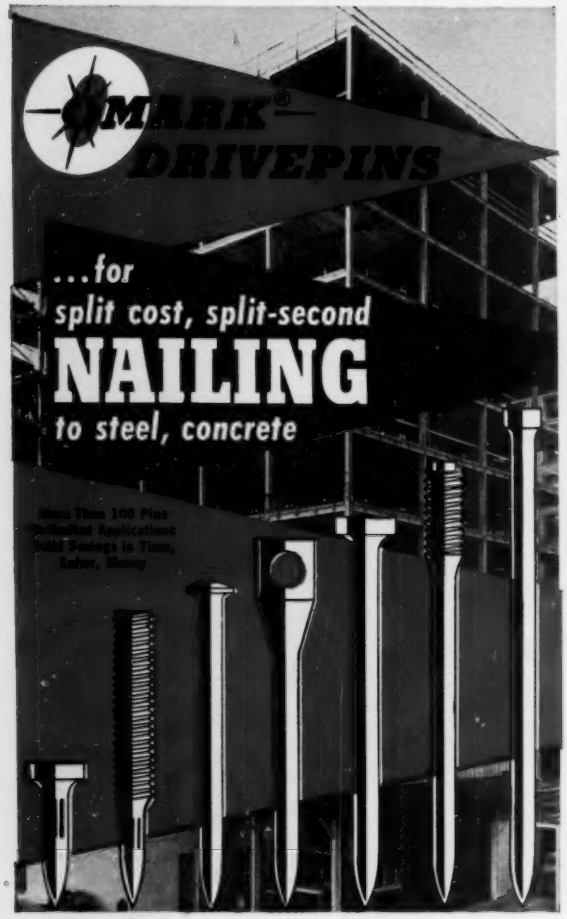

BIG OR SMALL—

You can "nail down" any steel or concrete fastening job with top quality OMARK Drive Pins

Whatever your steel or concrete fastening problem, you're money ahead when you literally "nail down" the job with genuine, precision manufactured OMARK Drivepins.

Choose your pins from the wide OMARK Drivepin stock line, or order an OMARK pin custom designed to your own specifications.

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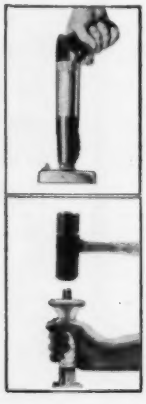
Let your qualified OMARK dealer help you select the right pin, the right tool, for solving your specific steel or concrete "nailing" problem. For his name and address look under "Tools" in the phone book yellow pages, or write direct to the factory.



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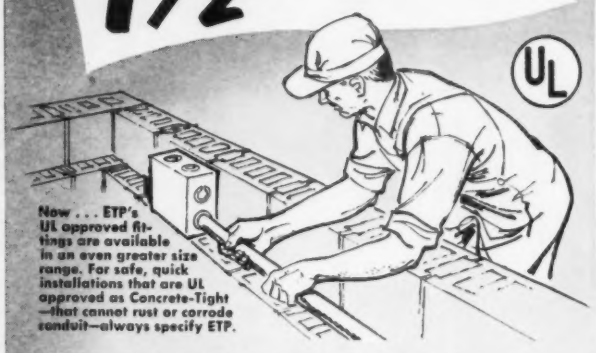
ETP

CONNECTORS and COUPLINGS

NOW AVAILABLE IN 1½" and 2" SIZES


UL
Now . . . ETP's UL approved fittings are available in an even greater size range. For safe, quick installations that are UL approved as Concrete-Tight —that cannot rust or corrode conduit—always specify ETP.

- Pre-set and staked screws. No backing out to insert conduit.
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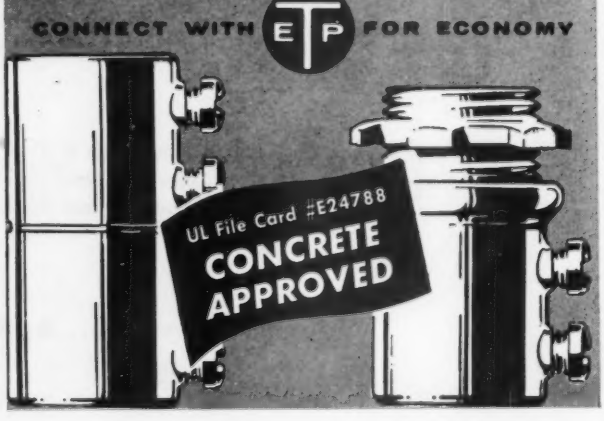
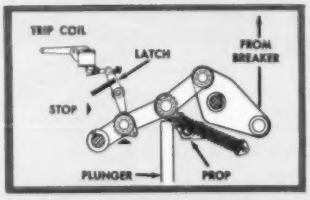
CONNECT WITH ETP FOR ECONOMY



For positive protection this Pneu-Draulic operated breaker is mechanically trip-free



This simple uncoupling linkage is key to protection

Contacts can open at full rated speed with the Allis-Chalmers mechanically trip-free mechanism regardless of position of closing mechanism.

Breakers that are only pneumatically or hydraulically trip-free can't give you this protection.

Pneu-Draulic is an Allis-Chalmers trademark.

Get details on this and other features of Allis-Chalmers breakers. Call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

ALLIS-CHALMERS

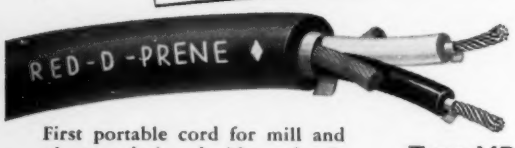
A-5243

Diamond "Red D"®

WIRE and CABLE

YOU KNOW THEM, YOUR CUSTOMERS KNOW THEM AS QUALITY PRODUCTS

Accepted as one of the best in the industry, Diamond Wire products have earned this reputation through a continuing program of production control, research and product development. Your order on any Diamond product triggers immediate action . . . maximum service to you.



First portable cord for mill and plant use designed with tough, oil-resistant Type MD* neoprene sheath in Industrial Red for ready Identification. *(Mill Duty).

Type MD® (Mill Duty) RED-D-Prene®

Thermoplastic insulated and jacketed non-metallic sheathed cable. Retards flame and has excellent resistance to moisture, corrosion, fungus, abrasion. Listed by UL.

Diamond DUF® Type UF

Non-sticking, smooth and easy to pull, Diamond DTX will not flake off. Moisture and flame resistant, it is clean to handle and strips easy.

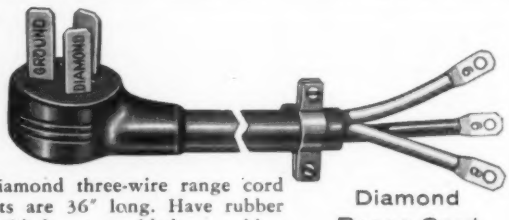
Diamond DTX® Non-Metallic White Sheathed Cable

Flexible steel armored cable ideally suited for general lighting and wiring in non-fireproof homes. Available in two, three and four conductor.

Diamond ABC Armored Bushed Cable

May be used without conduit from pole to building and down side of building in places not subject to mechanical injury. Listed by Underwriters' Laboratory.

Type SE Service Entrance Cable (Armored and Unarmored)



Diamond three-wire range cord sets are 36" long. Have rubber molded cap, molded on rubber jacketed cable—are complete with steel strain relief. UL approved.

Diamond Range Cord Set

Trade Mark ®

DIAMOND

WIRE and **CABLE** Company

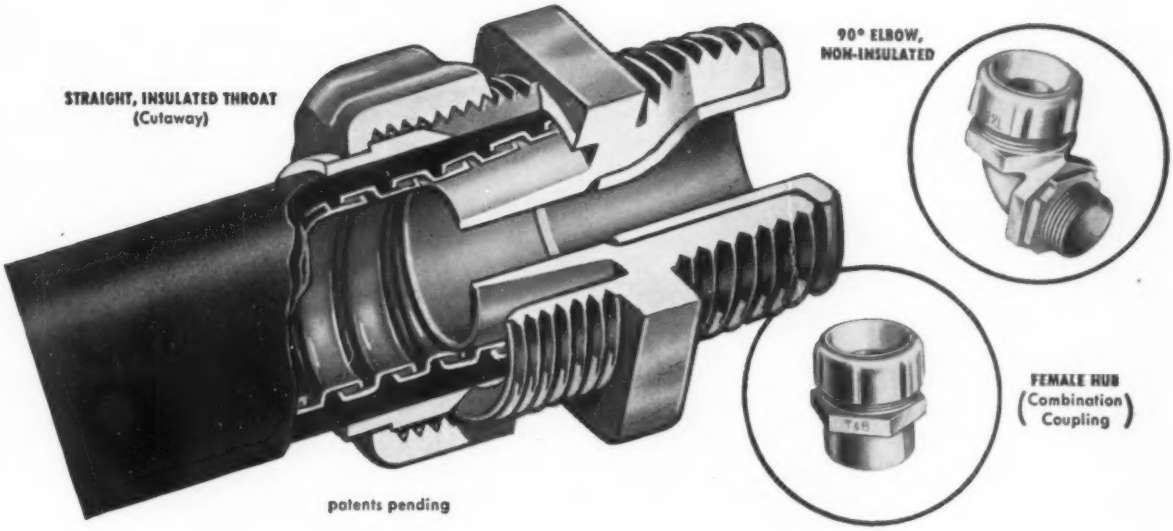
Sycamore, Illinois

WAREHOUSE: BIRMINGHAM, ALABAMA

ONLY T&B CONNECTORS

*for flexible liquid-tight conduit**

OFFER ALL THESE ADVANTAGES



THE T&B LINE provides a size range of ⅜" to 4" in the straight, 45° and 90° angle types . . . both insulated and non-insulated.

THE T&B LINE includes combination couplings from ⅜" to 1¼".

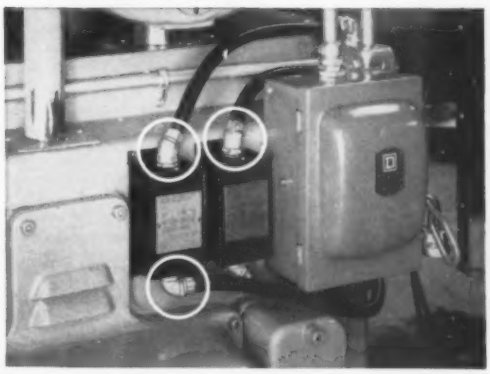
A T&B Liquid-Tight connection can't be half safe. The mechanical strength, continuity of ground, and oil seal are all interdependent. Each gives positive assurance that you have all three. And T&B's more compact design means easier installation and improved appearance.

Your T&B distributor has this complete line in stock. Be sure to ask for a demonstration . . . or write direct to T&B for detailed specifications.

* *Sealtight or equivalent*

THE T&B INSULATED LINE complies with all codes:

The National Electric Code (Paragraph 3736b)
J.I.C. Standards (Paragraphs 22.1.7 and 22.2.2)
Machine Tool Electrical Standards (Paragraph 22.1.7)



LOOK FOR THIS SIGN — AUTHORIZED DISTRIBUTOR T&B ENGINEERED

IT'S THE MARK OF AN AUTHORIZED **T&B** DISTRIBUTOR

The complete line of T & B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs.

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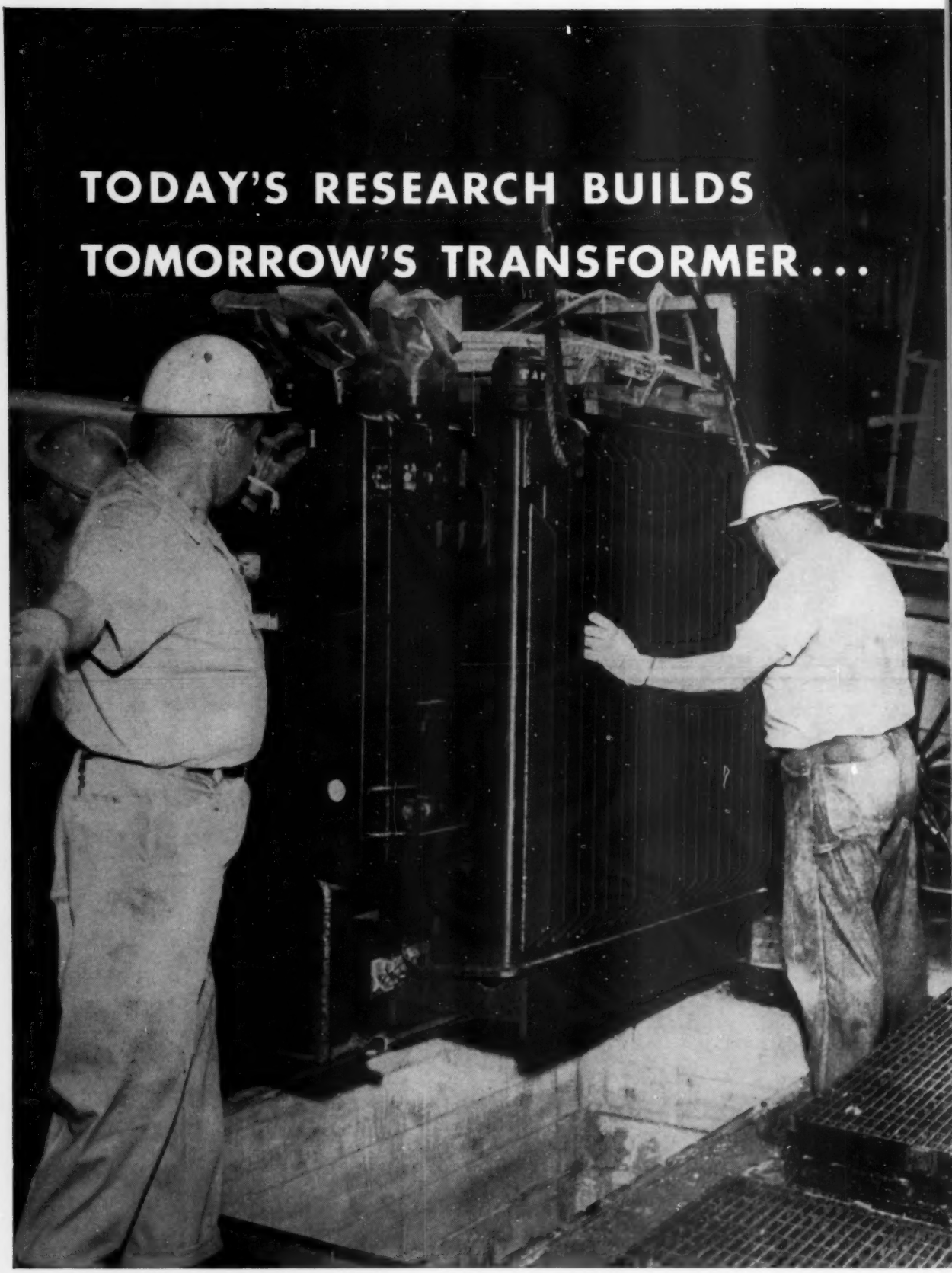
THOMAS & BETTS, LTD., MONTREAL, P. Q., CANADA
MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898


TODAY'S RESEARCH BUILDS
TOMORROW'S TRANSFORMER...

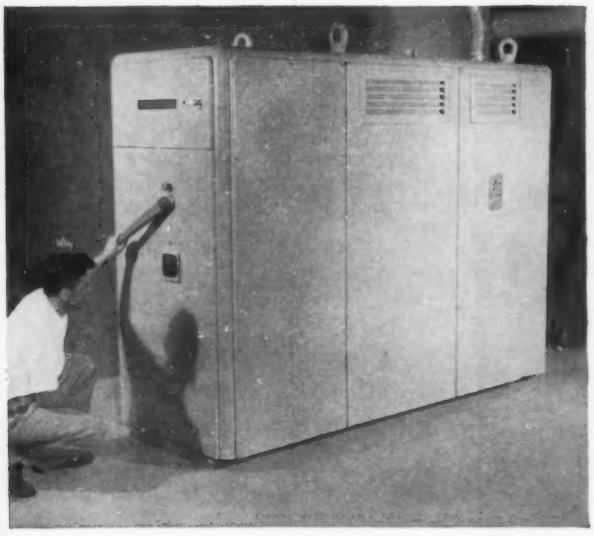
WORLD'S FIRST IN COMMERCIAL SERVICE, NEW WESTINGHOUSE TRANSFORMER COOLED BY HIGH-DIELECTRIC STRENGTH GAS

In July, 1957, the world's first and only commercial installation of a vapor-cooled transformer utilizing high-dielectric strength gas went into service. This unit, operating on the network system of the Consolidated Edison Company of New York, is another product of continuing research and development at Westinghouse.

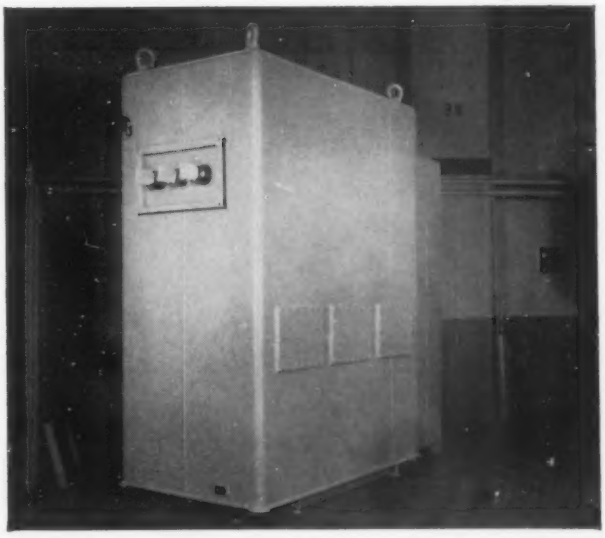
Announced first by Westinghouse in 1951, vapor cooling is another long stride toward the transformer of the future. Now larger, higher voltage transformers are in design and construction, utilizing the knowledge and experience gained from the development of this unit. These larger transformers will make full use of the advantages of vapor cooling.

The Westinghouse principle of vapor cooling is one more in a long line of developments resulting from plowing back earnings into research . . . another example of Westinghouse co-operating with the utility industry to help keep electricity America's biggest bargain. J-70831

YOU CAN BE SURE...IF IT'S Westinghouse



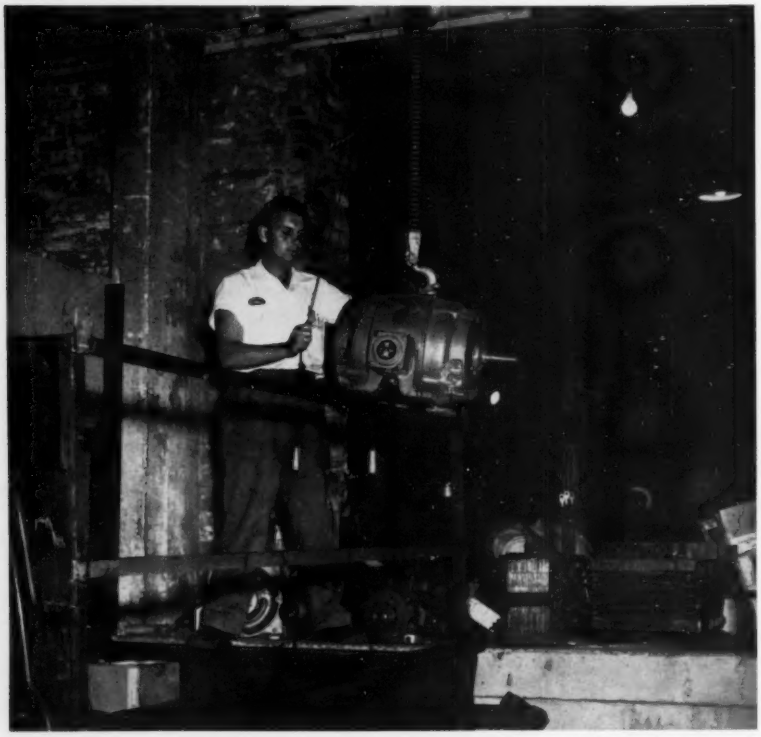
The ventilated dry-type transformer, which is the heart of this integral substation, was introduced first by Westinghouse 20 years ago.



The sealed dry-type transformer shown here is another Westinghouse first . . . now has 15 years' proven experience behind it.

Resourceful use of modern

A fork-lift truck facilitates installation of an 800-pound island canopy lighting fixture by raising unit to desired height.



Drive-in loading dock at basement level, away from busy street, speeds up handling of materials. Electric motor is easily loaded onto truck by one man using electric hoist running on overhead rail.

By Warner Ogden

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers ✓
- Consulting Engineers

◆ WITH TODAY'S MARKET increasingly marked by strong competition, the successful contractor is more and more often the one who has most increased labor efficiency through more intensified and unique use of modern methods and tools.

Tennessee Armature and Electric Company, Knoxville, Tenn., devotes a great deal of effort toward research aimed at reduction of on-the-job costs. They discovered that an initial investment in labor-saving tools plus an important follow-through maintenance program on this equipment really saves money.

W. G. Hoffman, president of Tennessee Armature and Electric Company, explained, "Constantly rising labor costs make it increasingly imperative to plan our jobs using the proper tools and equipment, and to make sure that they are on the job at the right time. We constantly search out new equipment as well as explore all possible innovations which save money for us and for our customers."

Sizable capital outlay

Although equipment, in most cases, involves a sizable initial capital outlay, the dividends it reaps are proportionately larger. However, in contemplating equipment purchases, it is essential to ascertain that the usage will justify the capital expenditure.

Tennessee Armature and Electric Company thoroughly analyzes not only immediate demand but also the potential future usefulness of all equipment purchased.

For example, on one job, it was necessary to core-drill 300 six-inch holes through eighteen-inch

equipment reduces job costs

reinforced concrete floors. An improvisation consisting of a pneumatic drill mounted on a gasoline powered fork truck provided the downward pressure for the drill as well as providing mobility within the building.

It was decided to purchase, instead of renting, the fork lift truck because careful analysis revealed many additional future uses for the equipment. Added convenience in handling material around the shop and ease in setting transformers, motors, motor control centers and other heavy equipment on the jobs has definitely proved the wisdom of the investment. The fork-lift truck is easily moved from job to job on a trailer which can be pulled by any of the company's trucks.

An unusual and pleasantly unexpected use came in installing the 800 pound island canopy fixtures so common in today's service stations. The fixture is easily lifted to convenient working height, speeding the work of internal connections. Next, the fixture is lifted and placed effortlessly on its supporting posts. Entire installations are effected quickly and easily with only two men—one operating the fork lift,. and one guiding the fixtures onto the posts.

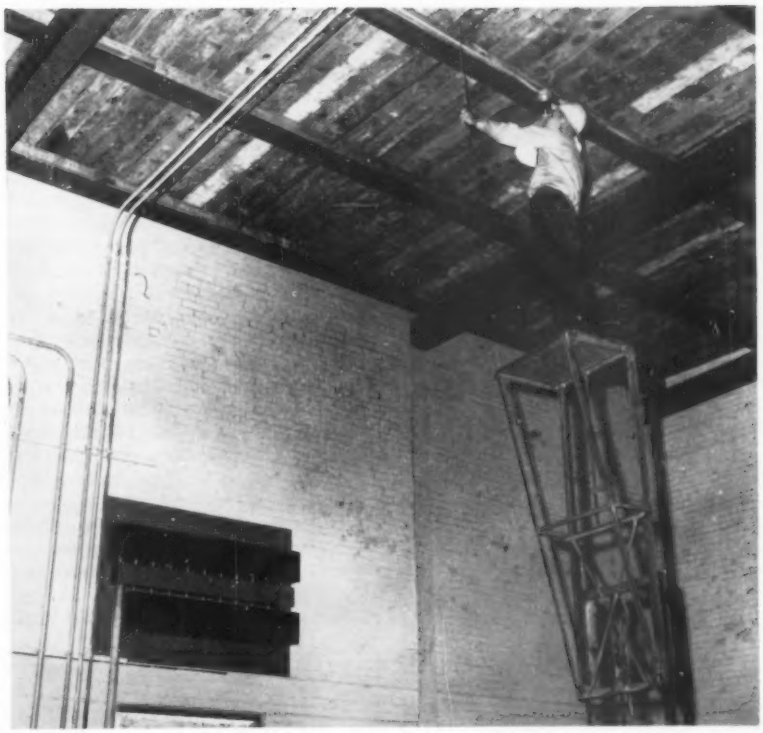
Inventive adaptations

Mr. Hoffman, who is present governor of the East Tennessee chapter of NECA, commented, "Without this inspirational adaptation of our equipment, this type of job would require several men on ladders or a line truck fitted out with an "A" frame hoist and would take much more time and money to complete."

Thus, complete analysis and utilization has turned equipment usually relegated to materials handling into important electrical construction equipment. Needless to say, Tennessee Armature's customers are well satisfied with such cost-cutting "tricks of the trade."

Mr. Hoffman highlighted some of the other Tennessee Armature inventive adaptations: "In one of our pickup trucks, an aluminum

(Continued on page 109)



The telescoping combination hoist and ladder used by Tennessee Armature and Electric Co., of Knoxville, saves from 50 to 70 per cent labor time in erecting bus and fluorescent fixtures.

Removable extension ladder fits into brackets bolted into truck bed. Bolts can be removed and truck used for another purpose.

Good management creates profit

By Anna A. Fagan

Treasurer
Fagan Electric Co., Inc.
Little Rock, Ark.

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities
- Electrical Wholesalers ✔
- Electrical Inspectors
- Industrial Engineers ✔
- Consulting Enginers

◆ IN FORTY YEARS of dealing with trained men and time-saving tools, I have had abundant opportunity to conclude that good management practices are essential to balance men and tools profitably. Trained men accept new machinery and tools with caution and sometimes with suspicion. They must be convinced that power tools and time-saving devices make them better craftsmen instead of presenting a threat to their own skill and their means of earning a good living.

In our electrical engineering and contracting business, that sometimes employs 800 men on a single project, we thoroughly value power and time-saving equipment. We have set up a program designed to make our men respect and appreciate the tools we supply them, and to use them to their profit and to ours.

Employee attitude

We have discarded from our tool vocabulary the term labor-saving. *Time-saving* describes our power tools and efficiency devices. Before we had a clean-cut program in buying and managing tools and equipment, our men rather resented the addition of new power tools to our shop and equipment warehouse. Now, when Construction Superintendent J. A. Bigbee welcomes a tool salesman who has something new to show, no one is critical.

When an important new tool is bought, we have a factory engineer put on a demonstration to the men who will use it. The safe use of the unit is stressed. Our regular safety program includes instructing personnel in the correct use of all our tools.

Safety program

This safety program is strengthened because we have our own repair shop, equipped to inspect everything used for safety, and to do much of our own repairing. Tools and equipment that we cannot repair ourselves are sent to accredited repair stations.

Our tool list includes adequate numbers of electric grinders, power hack saws with all the necessary accessories, power drills, electric welding equipment, pipe threaders, and electrical testing devices. Our underground pipe pusher is a tool that our men value.

Our repair shop is unusually well equipped with time-saving devices, many of them routed and arranged for safety and utility. Among these devices we have supplied to save time, Service Manager T. H. Dunkle picks the mobile electrical fork lift truck as the most useful. He declares that this unit does hundreds of jobs that would require many hands to accomplish. As a materials-handling device, it demonstrates its utility many times every day. It can pick up any object, no matter how heavy, and spot it on a work bench. Many shops that are doing without a power fork lift, he says, would profit by adding it. He also prizes our 20-ton crane that performs huge jobs under one man's handling.

Tools are under the immediate supervision of Chief Construction Clerk Charles Thompson, who charges them to each job. Two men in the tool warehouse are responsible for the return of all tools to the central station. When tools are returned, they are inspected and repaired immediately.

At the start of a large project, we make up a tool list. The tools are assembled and sent to the job, in charge of job superintendent.

Service Manager T. H. Dunkle, of Fagan Electric Co., demonstrates the one-man operation possible with use of the mobile lift-truck.

from time-saving equipment and tools

Tool check system

For portable tools, the superintendent uses the tool-check system. Each workman is given five or six tool checks, with the badge number on each. Every tool is accounted for on our tool board. When a worker checks his tools out, a tool man puts the numbered checks on the tool board.

On small jobs employing only ten men or less, tools are charged out to the foreman. Each day small portable tools are returned to the work box and locked up, to be held in the portable warehouse, or returned to the central station. This system is working efficiently for us, and our tool loss is negligible.

In charging power tools to each job, we use the Associated Equipment Dealers rate guide, which supplies a tool rate for each operation. This works out equably in charging each job its pro rata share of tool and equipment expense.

Small tools are often expendable items, charged to each job. We have worked out a system for buying them that is actually a part of our public relations program. We buy small tools on job location. Local dealers and supply people throughout our area know us, and value the patronage we give them.

Good public relation activities have had an important influence on our growth and expansion. When we set up our portable warehouses on a job and put out our signs, we want the town to be happy that we are temporarily there. Buying on location is worth more to us than saving a few dollars on tools and supplies.

Our time-saving tools and the outstanding equipment we have in our machine shop and our electric motor repairing shop are valuable sales aids.

Sales Engineer Ellis Fagan III recently accredited the shop's coil press as a major factor in landing a big contract for us. "I explained to the prospect that we are prepared to give outstanding maintenance service because we have a device that provides more insulation for some motors than was designed by the manufacturers. This prospect was having plenty of motor trouble, and he listened eagerly to what I could tell him about the coil press."

Tool loss

Good management methods prevent loss to our large tool investment. The men who use the tools are responsible for breakage and loss. However, in line with our policy to influence our employees to value our time-saving devices, we seldom charge them for loss or breakage. Our own excellent repair facilities enable us to repair or rebuild much of the equipment we use. Our machine shop is often used to repair our equipment. We repair our own electrical machines.

Our policy in tool-buying is to

(Continued on page 106)

A tool of multiple uses, the electrical hacksaw cuts conduit on job site.

Electrical pipe threader seen here in operation on a large construction job is a valuable time-saver.

Efficient equipment handling

With an investment of nearly $200,000 in power tools, Walter Truland Corporation puts about $20,000 yearly into their maintenance and repair. A full time mechanic is required to inspect and service equipment.

By Ward B. Huzzard

Secretary-Treasurer
Walter Trulan Corporation
Arlington, Virginia

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers ✓
- Consulting Engineers

◆ IN ORDER to produce a modern competent job with the greatest amount of efficiency, we are convinced it is necessary to have labor-saving power tools. They are a means to remaining competitive with other contractors in the field. In an estimator's responsibility to manage a job competently and profitably, he gives earnest attention to the power equipment he will employ on the job.

Walter Truland Corp., of Arlington, Va., maintains forty-four road trailers, such as the one shown at left, for equipment transportation and storage. Above, a hydraulically operated cable gun is demonstrated at one of the regularly held tool instruction classes for supervisors and engineers.

program

As contractors handling mainly industrial, commercial and government work, we find that the wide scope and great variety of jobs we carry out ranging in price from $25,000 to $3,000,000 as well as the number of jobs in progress at one time necessitate a large investment in tools.

Our investment in power equipment is nearly $200,000. This figure can readily be understood when it is realized that large and complex jobs require a great variety of tools, while special jobs frequently require special tools.

For example, a recent line construction job of $230,000 handled by a crew of forty men carried an investment of $40,000 in tools. Since we have about fifty jobs running simultaneously, it is necessary to have several duplicates of the same tool. Duplicates take care of breakdowns as well.

IBM equipment records

We keep equipment records on IBM machines. At the beginning of

The post-hole digger above is one of the many labor-saving devices employed by this company. Industrial, commercial and government jobs ranging to $3,000,000 require a heavy investment in power equipment.

A recent $230,000 line construction job was handled by a crew of forty men and carried an investment of $40,000 in tools. With about fifty jobs running simultaneously, it is necessary to have several duplicates of the same tool in order to take care of breakdowns as well.

a job when an engineer plans how many men will be needed, what tools will be required, etc., a ticket is made up by the clerk listing the tools issued on a particular job.

As the job goes along and additional tools are needed, the job superintendent notifies the stockroom by written requisition. As noted above, the tools issued are recorded on a form and from here posted first to a tool index card that details the tool and its location at any time.

This tool card carries such data as description of item, manufacturer's name, size, purchase date, from whom it was purchased (wholesaler or distributor), serial number, original cost and daily rental charge. (I should explain at this point that we handle tool costs charged to a job like a rental transaction conducted between our affiliate, Contractors Equipment Corp., and ourselves.)

On an accompanying card listing the tool's activity, we detail the job number it is out on, the date it went out and the date it came in. We place a red tab on a tool card when the item is in the warehouse.

A second posting is made to a form that records all tools charged to that particular job. Number of tool, description, date issued, date returned are filled in by a clerk. An IBM record card is made from this form. From the IBM card run through a tabulator, we get three items of information.

First, the listing of tools charged to a job is really a billing that gives number of job, equipment description and item number, daily rate, number of days charged, amount charged. In this manner we compute costs of tools to a job.

Equipment activity

The record provides other information. It lets us know what activity there has been on each piece of equipment, the number of days it has been in use for the current month and for the year to date. Maintenance cost is also recorded for the year to date on a piece of equipment. The record details maintenance cost: it relates kind of repairs, nature of wear or defect, pointing up repeated repair needs of a particular tool.

This information helps us know what tool is wearing well, how long a tool can be used before overhauling, pointing out among other things the merits of one manufacturer's product over another. As we study the maintenance record of an air compressor, for example, we know how often the motor has to be overhauled.

We put about $20,000 a year into the maintenance and repair of our tools. We have a full-time mechanic who inspects equipment after each job, cleans, oils and replaces parts that have become worn or defective.

Equipment storage

We have a 15-ft. x 20-ft. room for small tools and a 40-ft. x 40-ft. area in the building for larger tools. On a project we store tools in road trailers bought from haulers. As used equipment no longer adequate for their needs, the trailers cost us $1,000 a piece including reconditioning, painting and bin, shelf and drawer construction in the interior. We have 44 of these trailers for equipment transportation and storage for local as well as out of town jobs sometimes in such distant projects as Ohio, Pennsylvania, Delaware. Our full-time mechanic on tools keeps our rolling stock in good repair in our own shop. Trailers on distant jobs are taken care of by local automotive repair shops in the event of breakdown.

Our investment in rolling stock and tools is covered by an equipment floater insurance policy. Precaution is taken against loss or theft of tools on a job by placing responsibility with one person for the issuing and return of tools. The job superintendent usually delegates this duty to one of his assistants. *(Continued on page 108)*

Apprentice training

Aptly named Mr. Confused, the

need for more journeymen and the

NECA convention promotes industry coordination

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers ✓
- Consulting Engineers ✓

◆ ALMOST 3,000 electrical contractors and their guests convened in Cincinnati, November 11-14, to discuss ways and means of better coordination of the electrical and construction industries in order to meet the rapidly rising demand for electricity.

The meeting was the 56th Anniversary Convention of the National Electrical Contractors Association and the Third National Electrical Exposition. All sessions were held in the Music Hall and began with the meeting of the NECA Board of Governors on Nov. 11.

President Oliver F. Burnett, chairman of the Board of Kelso-Burnett Electric Co., Chicago, explained the primary objective of the meeting thus:

Efficient use of resources

"Electrical use is doubling every ten years. Demand will require as much as 233 million kilowatts of generating capacity by 1966. That capacity now is 126.5 million kilowatts. This huge surge demands of those of us who have the responsibility of installing the systems that accommodate this use the most efficient employment of our limited resources of skilled craftsmen and management organizations to fill the need.

"Closer and more effective teamwork between the branches of the electrical industry on one hand and better teamwork among those of us comprising the construction team is vital. We are here to talk about and do something about practical cooperation in the public interest."

Increased cooperative action by the construction industry to deal with its problems, a hard drive to obtain final enactment of fair bidding procedure legislation on federal public works, an expanded national advertising and promotional effort featuring basic market research, stepped up educational programs, and expanded technical data service were among recommendations made by the nine standing committees of the association.

Chairman A. B. Weinfeld, Columbus, of the Governmental Affairs Committee reported that the legislative program advanced rapidly this year and the Federal Construction Contract Procedures Act (H.R. 7168) has only to be voted on by the Senate before becoming law. He called for the strongest efforts to enact this measure as soon as Congress reconvenes.

The committee also approved NECA participation as a direct association member in the Council of Mechanical Specialty Contracting Industries and endorsed the setting up of the National Joint Cooperative Committee of the Associated General Contractors and the Council.

Advertising program

Arthur E. Bertke, Cincinnati, chairman of the Business Development Committee, noted that this is the fifth year of intensive business promotional efforts by NECA. A four-point program was recommended, including institutional advertising of the qualified electrical contractor to be carried in *Time* magazine and basic research studies of market situations for the industry; expanded market data activity; and continued cooperation with trade allies on such industry promotions as House Power, Live Better Electrically, the National Wiring Bureau, and the National Lighting Bureau.

The report of the Research Committee, whose chairman is Charles P. Bobe, St. Louis, revealed important expansion in the industry statistical activity designed to guide management in its conduct of the business, and in developing new and improved labor and operating cost data.

The big news from the committee was completion of the Commercial, Institutional and Industrial Electrical Modernization Training Course, and the Residential Electrical Modernization Sales Training Courses. These are now a part of the NECA courses of study for management personnel. Another advance was the securing by NECA of the rights to a Simplified Mechanical Bookkeeping System adapted to an average electrical contractor's operations.

William H. Biester, Jr., Philadelphia, chairman of the Codes and Standards Committee reported a dozen activities of the committee in upgrading minimum safety standards and collecting data for the next edition of the National Electrical Code.

Steady organization of the line construction contractors into eight regional chapters was reported by C. W. Moseley, Charlotte, N. C., of the Line Construction Committee. Six of these chapters have been established and there are now 111 line constructors enrolled, which includes practically all of the important operators.

Reports on the active NECA labor relations program were made by Chairman Oliver F. Burnett of the Executive Committee; by E. R. Edenfield, Nashville, Tenn., of the Council on Industrial Relations; by Fred J. Oertli, co-chairman of the National Joint Apprenticeship and Training Committee; and by Paul M. Geary, co-chairman of the National Employees Benefit Board.

Apprentice training

To fill the need for more skilled workers, the joint apprenticeship and training program for the electrical industry has been accelerated. Although this is the pacesetting apprenticeship program in the construction industry, the committee was not satisfied with the expansion, good as it was. The national professional staff supervising the program was doubled during the year and there are now 27 full-time directors employed by area committees.

The Council on Industrial Relations, the industry's voluntary arbitration machinery, has heard and decided 48 dispute cases within the past year, all of them potential strike threats. Steady progress in the operation of the National Electrical Benefit Fund, which supports the electrical worker's old age pension program, was reported by Vice-President Geary. Total collections, plus interest from investments, for the 10 years and one month of the Fund's operation amount to $56,084,949.56. Collections for the first nine months of this year were 20 per cent higher than for the corresponding period of 1956.

Panel presentations and skits occupied a large part of the general program. One panel had as its topic the coordination of the electrical construction industry; another covered the subject of labor relations. The entire Friday morning session was devoted to a five-act skit designated as an episode in the life of "Confused Electric Co." The five acts dealt with specification problems, accounting, learning to sell, training for production, and meeting electrical inspections.

The skit brought out the fact that to stay in business today electrical contractors must shelve outmoded business methods in favor of modern techniques and must coordinate their efforts more intensely with other groups in the electrical industry.

How NECA serves

With E. R. Cornish, Director of NECA Research, playing the role of an electrical contractor stumbling his way through a day filled with problems caused by out-of-date bookkeeping, estimating and filing systems and by lack of cooperation with others in the industry, the skit created enthusiasm and interest among the electrical contractors.

Aptly named Mr. Confused, the contractor first encountered indefinite drawings and specifications which made it difficult to figure his bid accurately. He learned through his experience the importance of cooperation with architects and local chapters of the Construction Specifications Institute to improve plans and specifications.

He next encountered problems with his bookkeeping system. The convention in this skit was presented with the low-cost mechanical bookkeeping system developed by the Research Department, and now recommended to NECA members to replace the old hand-written systems.

The newly-developed NECA Sales Training Course was explained to the contractors after an abortive effort on the part of Mr. Confused to sell one of his customers on a job.

Foreman training through the NECA Job Management Course was recommended in the fourth act which included a panel comprised of instructors of three Job Management Courses successfully completed by NECA Chapters. Points on how to conduct these courses were offered for the benefit of other chapters and members.

The last act illustrated the need for closer liaison between inspectors and contractors to meet Inspection and Code problems. Contractors were told by Chairman W. H. Biester, Jr., of the NECA Codes and Standards Committee, Philadelphia; C. L. Smith, secretary, International Association of Electrical Inspectors, Chicago, and Robert Hammer, member of the Codes and Standards Committee, Toledo, Ohio, that these problems culminate at the point of inspection and should be solved prior to that time.

Contractors' future

The electrical contractors' part in the expansion of electric facilities in the next decade was emphasized by Edwin Vennard, managing director of the Edison Electric Institute, who addressed the convention first general membership session.

Reviewing the rapid growth of the electric industry in the past decade, and predicting an even more rapid growth in the next decade, Mr. Vennard said:

"Because of the tremendous work potential of the ten-year plan for rewiring, there is a definite need for more journeymen and the availability of qualified contractors. House modernization requires a top mechanic, a man with a high degree of skill, and above all, he must have a sense of public relations.

"Thanks to our great system of free enterprise, there can be no vacuum in meeting the demands of the consumer market today. In our economic system, it is impossible for a demand to exist without giving rise to the formation of a supply, except under unusual circumstances such as wartime operation. If you, as the capable and qualified contractors of the nation, fail to provide all the services people want, and if your effort still leaves the demand unsatisfied, other less qualified suppliers will move in to fill that vacuum and satisfy that demand.

"Here is where the 'basket contractor' gets a toehold on the market. The complaint of competition from this type of contractor is a constant one but until the same attention and enthusiasm is shown for these smaller jobs as for the large commercial ones, the 'basket contractor' will continue to invade the contracting field. His chief concern is to get the consumer's dollar and his distaste for the dirty, unpleasant work does not deter him from realizing his goal. By training qualified journeymen and by selling up so that the consumer gets a thorough and satisfactory contracting job, the professional contractor can retain his leadership in this as in other fields.

"The contractor is the key man in this program and without him, 'Housepower' cannot do the job for which it was designed. It is the hope of the industry that the acceptance and enthusiasm for the home rewiring program on the part of the contractor will grow in the immediate future. . .

The industrial picture

"In America today, 98½ per cent of our work is done by machinery. Our American factories produce over half of all the world's goods with the help of this machinery. As a result of the electrically driven machine, each factory worker has the equivalent of 279 helpers working for him today.

"By placing better and more efficient tools at the disposal of the American worker, we are enabling him to increase his real income in terms of what he can buy as well as raising the standard of living of

the entire nation in general. In order to provide the worker with these improved tools, we must bring about the modernization and increased efficiency of our industrial plants in terms of electric power distribution.

"As a result of this increased usage, wiring bottlenecks have been encountered. With appreciation of the need for good electrical distribution, the manufacturer will be able to eliminate this condition and produce more and better products, resulting in increased profits. This is good business for both the manufacturer and the contractor.

"In order to bring about this modernization, the Industrial Electrification Council has formed the Industrial Electric Power Distribution Division Steering Committee to develop an educational and promotional program covering this field. Although plans for this program have not extended beyond the drawing board stage, with many details to be worked out and approved as yet, it is hoped that it will receive full endorsement by NECA, EEI, and the equipment manufacturers.

"The program, slated to make an appearance the early part of 1958, will be similar to the 'Housepower' program in that it will attempt to make the small- and medium-sized industrial plants aware of the need for taking a fresh look at their existing industrial power distribution systems.

"In other words, what has been done to promote house rewiring through 'Housepower', a relatively small job in the eyes of the large electrical contracting businesses, is now being planned for the large contracting field by making plant owners and operators realize the importance of better wiring.

Industry wiring program

"Large additional amounts of electricity can be sold only to those plants that install or upgrade present equipment to handle the increased load. The program is being directed to those plants which do not maintain their own staff of electrical engineers. It will be built around a seven-week training course for use by utilities at the local level and will be aimed toward electricians, maintenance men and supervisors of the small- and medium-sized industrial plants.

"It will arm these people with the 'know-how' and appreciation of good plant layout in connection with wiring distribution. They will then be in a better position to sell their own management on a full and sound plan for up-to-date wiring. It will enable these men to show their management how the most can be obtained for their distribution dollar.

"It is not the intention of the industry to create competition for the contractor by training these people along 'do-it-yourself' lines. It will not compete with the current NECA program which covers the mechanics of such a job. Instead, this program will point out the whys and wherefores, the necessities and benefits of proper and adequate wiring distribution. . .

"You as the contractor will play a very important part in this program. A demand for your services will be created by the small plants that can't do their own engineering and rewiring, thus not only bringing you more business but business of a major proportion. You in turn must be prepared to use top-notch engineering and sales techniques in addition to the satisfactory completion of a rewiring job.

"As is the case with its companion 'Housepower' program, the utilities will undertake the preselling job to aid the contractor in making his part of the program as successful as possible."

Electric house heating

With approximately a half-million homes electrically heated in the United States today, it is time for a lot of people to get interested in electric house heating, reported Melvin H. Wessel, chairman of the NEMA Electric Heating Section, and sales manager of the Electric Heating Division of the Cavalier Corp., of Chattanooga, in his address entitled, "Electric heating—a field for coordinated electrical industry action."

"The electrical contractor cannot afford to hold back any longer on promoting electric heating. The very fact that you are here today is evidence that you are a leader in the industry, and you are seeking better ways of doing the job. There is an old saying that is just as true today as it ever was—'The future is made for those who prepare for it.'

"Electric heating offers the industry the most golden opportunity since Thomas A. Edison invented the electric light.

"If you are not already active in selling electric heating, I cannot urge you enough to get the facts before you leave this convention. There are many reputable manufacturers with display booths in your exposition who will be happy to show you their products and answer any questions that you might have.

"You, as an electrical contractor, have within your hands the greatest advantages ever available in selling a heating system. You have ease of installation, simplicity, no fuel storage space, no chimney needed, automatic equipment, no moving parts, freedom, cleanliness and safety.

"You will be interested in knowing the Electric House Heating Equipment Section of NEMA is holding its annual meeting here in Cincinnati in conjunction with your convention. This was arranged so that as many members as possible could attend your exposition.

Service size trend

"A few short years ago the electrical contractor would go into a new house, install a few lighting circuits, about one convenience outlet in each room, connect it all to a 30 or possibly a 60 ampere service and he thought he had completed a big contract. Today the picture has changed completely.

"Recently, I received a letter from a wiring inspector, giving the report of operation in an Eastern City of 4,000 population, and I quote 'In a nine month period of operation 50 residential customers installed a 60 ampere service, 137 customers installed a 100 ampere service, 190 customers installed 200 ampere service, and 15 customers installed 400 ampere service and larger.' Is this not evidence of the importance of selling electric heating through the electrical distributor and contractor?

"Electrical contractors tells us that selling electric heating increases their overhead about 5% and they triple their dollar volume and profit.

"Home building, feeling the pinch of tight money, will fall slightly below the one million unit mark in 1957. From all indications, housing starts will move up next year to well over a million units.

"Just recently the Census Bureau estimated the population on September 1, 1957, at 171,790,000. This was an increase of 20,657,000

(Continued on page 107)

IT'S NEW! Coal-custom blended

League meet features wiring promotion

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

◆ WIRING modernization promotion programs came in for considerable discussion at the 22nd annual conference of the International Association of Electrical Leagues. The subject of selling-up wiring was approached from several angles and three of the feature addresses are presented here in abstract form.

Contractors report on wiring program

By John R. Waitas

Bond Electric Service
Cincinnati, Ohio

We are an average size contractor, doing business with the average problems. The only unique feature to our set-up is this: Bond Electric Service, except for four per cent of its business, finances all of its work through the Cincinnati Gas & Electric Company's "wire-on-time" plan.

When the plan was announced it became the subject of vigorous debate among electrical contractors. Related service organizations also got into the act. Arguments were of the pro and con variety. The "pro" case was put forth by contractors who were in the habit of waiting for their money—an example being the electrical contractor and heating contractor doing new house work, where affidavits, and work by other trades caused delay in payment.

Paradoxically, the "con" side was presented by elements who stood to gain most by the wire-on-time program—this was the electrical contractor whose work consisted almost entirely of rewiring existing homes. Financially, his modus operandi had always been cash upon completion.

With the advent of the wire-on-time program, many new home electricians and even heating contractors plunged into existing home rewiring to take advantage of the market opened by the convenient payment plan.

However, they brought with them a sorry trait that still exists to some degree in the new home field—the cheapening of a job to meet competitive price bids.

As you can see, a vacuum was created for rewiring contractors who could:

1. Wait for their money for a few days after the job had been approved by the owner, the utility and the local code enforcing authority.
2. Ignore competitive price bids in the interest of a grade "A" installation.

Thus the Bond Electric Service was drawn into existence. Prevailing conditions were: Our utility had a time payment plan that had met with public acceptance. We had (including ourselves) four electricians, tools, and transportation. But we needed a policy, a working inventory, a training program to reduce the number of code rejections and to improve our position in sales, and customers.

A digest of our policy would read: "Give the owner of the existing home a wiring job that will compare favorably to the wiring in a well built new home." In more detail, adhere rigidly to the following practices:

1. Installation of a service entrance of at least 100 amperes capacity.
2. Installation of a circuit breaker cabinet with provision for all modern heavy appliances whether the owner possess them or not. The cabinet to also provide for additional small appliance circuits.
3. Removal of all convenience outlets from existing lighting circuits.
4. Grounding of all new work.

In our experience, we have found that the wire-on-time plan has given us the following advantages:

1. Wiring modernization is in a better position to attract the customer's dollar in competition with automobiles and other merchandise which can be financed over a period of years.
2. When the cost is measured in only a few dollars a month, the customer is willing to consider wiring improvements beyond those originally contemplated when inquiry was made of the electrical contractor.
3. With a financing plan available, the electrical contractor becomes sales minded and does not hesitate to recommend additional wiring improvements or wiring capacity to provide for future growth.
4. When collection problems are eliminated and the market stimulated by advertising, many contractors, who formerly were not interested in wiring modernization, became active in this market because it is less competitive.
5. Electricians and wiremen are encouraged to become contractors in the field of wiring modernization because the need for working capital is reduced by the prompt payment by the utility.
6. With lighting fixtures being included in the plan, an excellent means is provided for introducing good fixtures into old homes and small commercial establishments.
7. With mortgage money tight for new homes, more people are turning to remodeling and modernizing their existing homes, and there is a chance for a better job with more profit in it than in a new home.
8. The advertising program incident to the promotion of wiring modernization under the wire-on-time plan dovetails beautifully with the national Housepower and Live Better Electrically programs. As a result the public is becoming aware of the benefits and importance of proper and adequate wiring. We have noticed the following effects: landlords, who would otherwise be unwilling to invest money in wiring modernization, will make the investment in order to attract desirable tenants; home owners realize that the value of their property is in-

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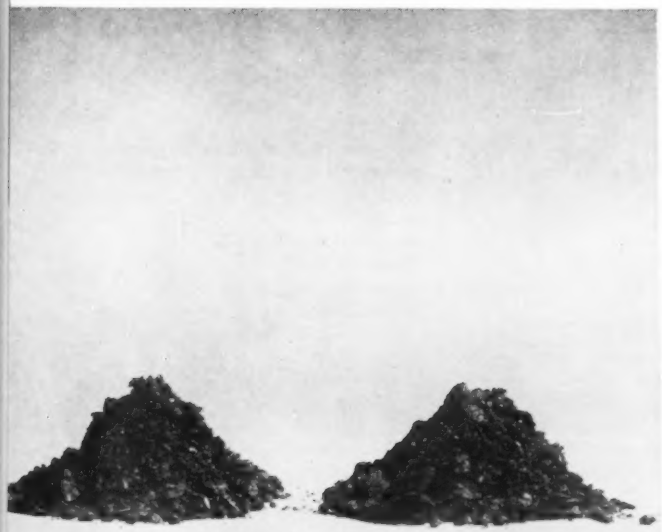

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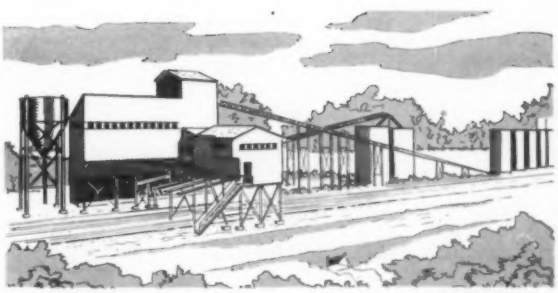

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creased by wiring modernization and do not hesitate to make the necessary investment.

Technically we've pushed out in front by buying only cable containing a grounding conductor. In keeping with the recommendations of the National Wiring Bureau, we have discontinued the purchase of wire less than 12 gauge.

The working inventory problem was solved by one local distributor. (Nobody else wanted our account.) It was found that by dealing with a single supplier, many advantages over the "shopping" method were being realized. Bookkeeping was simpler, courtesies were being extended, information on price changes were made available in advance.

As for training, two men have attended every evening session of a class instructed by an inspector of the local code enforcing authority. The tuition was a business investment that really paid off. Our rejections were confined to four minor corrections in a one year period.

The Housepower forum solved the rest of our training needs. Whereas it did not make crackerjack salesmen of us, it did increase our ratio of sales close to calls made.

The wide publicity given the wire-on-time program, by the utility, to which we tied weekly, high-impact advertising, started the customers our way. Distribution of leads by the Electrical Association and leads developed at expositions and the food show added to our business. Presently, referrals from satisfied customers make up a large portion of our work.

Commercial wiring... NWB's newest baby

A comprehensive discussion in slide form on the National Wiring Bureau's newly developed commercial wiring promotion program was presented by E. P. Werley, director of market development for Pennsylvania Power and Light Co.

The planning materials and information designed to help local groups establish and conduct commercial wiring sales and promotional programs already include a plan book "Lets Talk Business"; a drug store Powerating sheet (somewhat similar to the Housepower rating sheet) which is the forerunner of a series for specific commercial occupancies; individual sales folders on each type of occupancy, the first five covering drug stores, restaurants, apparel shops, food stores, and offices; slide presentations; etc.

In answer to the question, "What can be done locally?", Mr. Werley offered the following effective suggestions:

Foster a commercial institutional wiring committee as a means of organizing common action with electrical contractors, distributors and electric companies.

Assign a member of your staff with the specific responsibility of furthering commercial wiring.

Develop plans for a joint promotion of commercial wiring in your area.

Institute joint programs promoting electrical applications in commercial occupancies.

Distribute adequate wiring literature.

Seek speaking engagements with local merchant associations or similar groups.

Disseminate information on commercial institutional wiring promotions to your own members via newsletters or general information bulletins.

Keep your membership abreast of commercial institutional adequate wiring promotions through distribution of the Adequate Wiring Reporter.

Act as a central clearing house on commercial wiring information as well as on commercial appliances and equipment for the benefit of your membership.

Maintain permanent displays showing typical commercial installations so that members may use them as effective customer-demonstration units.

Participate in all trade shows, directed to commercial-type customers.

Conduct sales training programs for contractors, distributors and electric company personnel.

Electrical contractor— how well can he sell

By P. C. Goodenough
Better Homes and Gardens Magazine, Des Moines

We have a deep, vital interest in this residential rewiring problem. We asked ourselves, what further can we do to help overcome this low Housepower situation.

We realize that competition for today's consumer dollar is intense. Countless industries are extolling the reasons why the public should spend its money to buy their product. National advertising creates a desire for a product: it opens doors for a salesman. However, it does not move a pencil across an order pad. Salesmanship alone does that. Salesmanship, then, is obviously going to be an integral factor in bringing a greater electrical way of life to millions of American homes.

But whose salesmanship? One man—the electrical contractor. He is the man who is going to get this job done. From this process we felt we could contribute to this mutual problem by helping the electrical contractor be a better salesman. In doing this, if we ran a contest—a selling contest—and passed the information we were able to pick out of the entries to you as an industry, we felt we would be contributing to help the electrical contractor be a better salesman. He would be more competent and able to carry out his responsibility in this much needed program.

Contest uncovers data

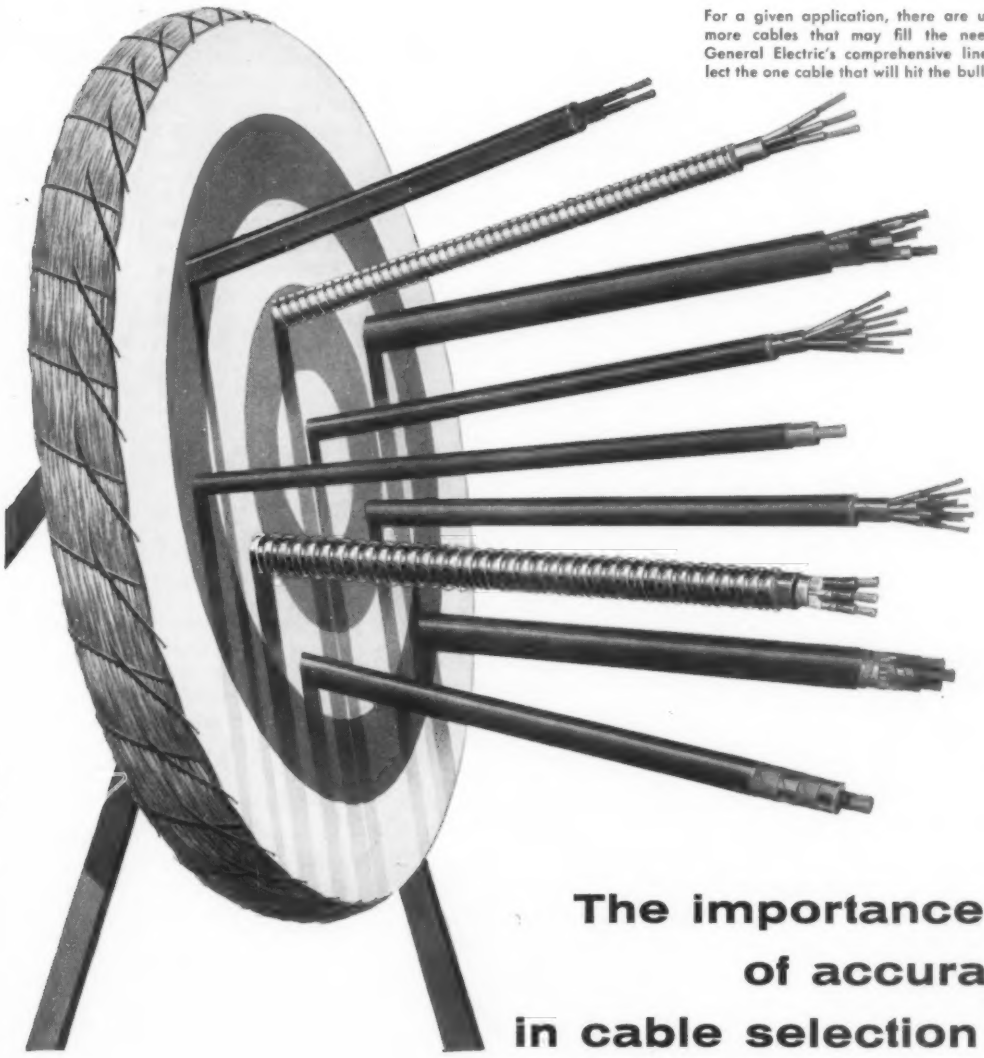
As you know, we sponsored such a contest: A contest for electrical contractors to tell us the selling methods and techniques they used on how they sold their best Housepower job. We asked him to fill in a logical step by step sequence of how he made his best Housepower sale. The questions he was asked to answer were.

1. How did you first get the customer's name?
2. How did you make the initial contact?
3. What selling tools did you use?
4. What did you do to get the interest of the buyer?
5. What points that you presented sold the customer—the sales clincher?
6. Did you sell more than what the customer originally had in mind?
7. What interested the home

owner the most?

There simply wasn't enough of

made along this line because of the



For a given application, there are usually one or more cables that may fill the need. And from General Electric's comprehensive line you can select the one cable that will hit the bull's-eye for you.

The importance of accuracy in cable selection

Today, selection of the best wires and cables for your customers' particular needs demands that a wide variety of factors be considered, ranging from standard requirements such as flame-resistance, heat-, moisture-, and weather-resistance — to special constructions which withstand vibration, the electromagnetic effects of adjacent power cables — even the effects of atomic radiation.

General Electric has developed hundreds of cables for just about every possible application. Thus, General Electric engineers are never limited to one wire or cable for a given job but can suggest the most efficient and economical solution for the particular situation.

This is one of the important reasons why many electrical contractors work with General Electric wire and cable engineers when they're planning important wiring jobs. Another reason is General Electric's knowledge of the requirements of other basic components of power distribution systems—transformers, load centers, switchgear, etc.—the knowledge that the right cable plays an important part in satisfactory system performance.

All this adds up to experience that can benefit you. Take advantage of it the next time you have a cable selection problem. For information on your specific wire and cable application or selection problem, see the G-E wire and cable specialist in your locality or write Section W207-824, Wire and Cable Department, General Electric Company, Bridgeport 2, Connecticut.

LIVE BETTER ELECTRICALLY

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owner the most?

8. Please describe any other selling techniques you employed.

In order to help evaluate as to just how good a sale was, we also asked four additional questions:

1. How large was the home?
2. Circuits available before and after the job was done.
3. Size of service before and after the job was done.
4. A check list for major appliances used in the home.

Entry forms were distributed through electrical leagues, utilities, manufacturers, and distributors. They, in turn, worked with their local contractors. We were enthused with the results.

One of the basic points of selling is prospecting—initially getting the customer's name. In a salesman's vernacular it is called pounding the pavements, or punching doorbells, or what have you. Frankly, our friend the electrical contractor is weak on this point. On the question, "How did you get the customer's name?" — entry after entry said the same thing — almost like a broken record: "The customer called me." "Their name was given to me by the local utility."

Little real prospecting

We have no quarrel with utilities cooperating with contractors and feeding them prospects names. We did get the feeling the contractor was relying on this source of supply much too much, and we do think this is bad. Here is the breakdown of how the contractor originally got the prospect's name:

Customer called me	57%
Through the local utility or league	33%
Own advertising	7%
Other methods	3%

When you take the first two methods mentioned—in which the contractor did not have to do any prospecting—you don't see a healthy picture. 90% of the prospects names the contractors received were handed to him, requiring no effort on his part. They came over the phone with a call in, or were referred to him by his local utility or a contractor. 7% of the names gathered were through the contractors own advertising efforts and 3% with other methods such as this one:

"I contacted Mr. & Mrs. Schoolay after reading of the transfer of property in the newspaper. Property transfers have been a good source of names."

There simply wasn't enough of this type of prospecting. The figures speak for themselves.

Our research at *Better Homes & Gardens* has shown that a major home purchase—whether it be rewiring, furnishings, or landscaping—is a husband and wife venture. In postwar years this trend has become increasingly prevalent. We feel it is a factor in selling a major home product that should never be overlooked.

In making the initial contact, or first call, we found a better picture of good salesmanship than with the first step. However, there is still room for improvement. Here is a breakdown of how our friend, the electrical contractor, operated:

Called when both husband and wife were home	55%
Called on either the husband or wife alone	32%
Others	9%
No answer	4%

By "others" I mean such answers as the one contractor who told of both husband and wife working and they left the key for him to go through the house to make an inspection.

This, too, then is an area where perhaps you will want to place more emphasis in your training programs.

What sales tools used

Now for the question of sales tools. There is a peculiar sales problem involved in selling rewiring. A contractor must sell tangible items such as wires, service entrances, outlets, and switches. Coupled with the tangible items are such intangibles as safety and comfort. Therefore, we felt selling tools were definitely necessary. If not selling tools, a prepared sales talk—but only on a second best basis. A combination of the two would be the desired way of selling rewiring.

Here is the breakdown percentage-wise on this question:

Used selling tools	44%
Used a prepared sales talk	30%
Used neither	30%

A few contractors reported on using both tools and a prepared sales talk. This accounts for the total of the three percentages coming to 104%. It is interesting to note almost one contractor in three does not use selling tools or a prepared sales talk.

Progress has obviously been made along this line because of the many references to your training courses. However, there still seems to be a hard core of resistance holding out. It is typified by one entrant saying he had been an electrical contractor for 30 years and felt his experience in the field was all he needed to sell rewiring! We disagree, and we think most of you would too.

Incidentally, the Housepower rating sheets and visual aids were put to good use in many cases. Here is a man who uses a little psychology and good thinking. In part he reported: "I carry all selling tools in a brief case—giving the customer the impression that we handle calls in a business-like manner."

Another contractor used a very good selling tool. Among the estimate sheets and other tools he carried an outline of the financing available with the local utility and with the bank. We have found the method and availability of financing, of a major home purchase, is important to the buyer.

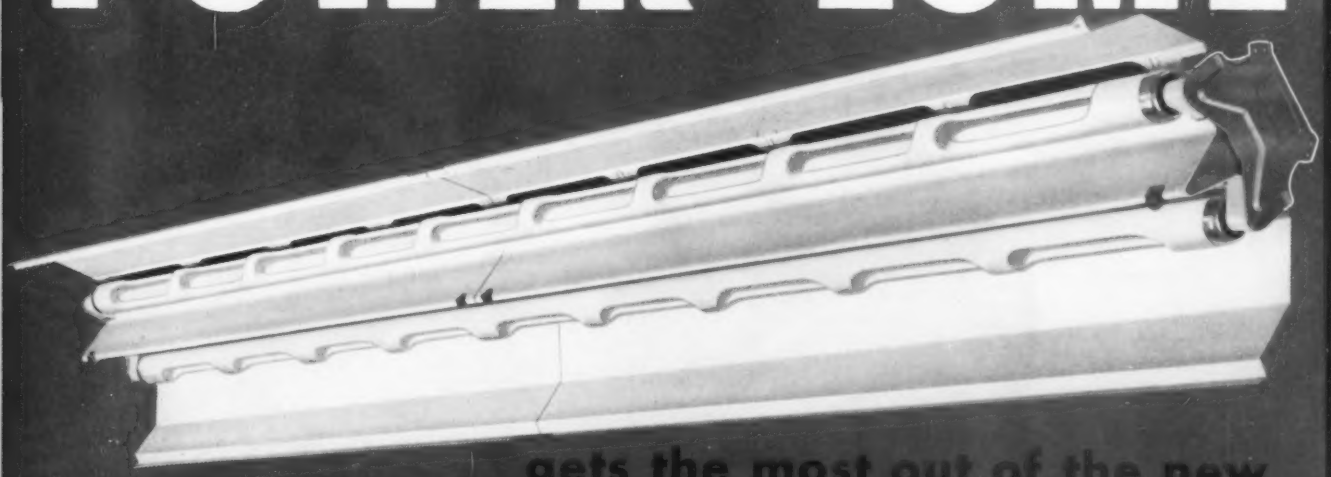
No major sale has ever been made without gaining the interest of the prospect. This interest can manifest itself in many ways. We asked what points the contractor emphasized to increase the buyers interest in the rewiring job. We believe every buyer has a point he is interested in—like a ready-to-light fire. It's up to the salesman to find the right spark to light that fire. To some, it may be safety; another economy; another convenience; and then still another, beauty. How did our friend, the electrical contractor, do on this point? He seemed to realize the need for such an interest and a point to emphasize.

Here is an entry where the contractor had several points he stressed: very good ones too! "I explained the need for more power to operate the appliances efficiently and showed that they could operate all the appliances and lighting at the same time, if necessary. By using circuit breakers and having the lighting circuits separated from the appliance circuits, danger of overloading the circuits would be eliminated; also, if we made the service large enough, it would take care of their electrical needs for years to come. I also stressed the safety factor of having stairs and porches well lighted. I also pointed out the value of yard and lawn lighting

(Continued on page 106)

Wheeler ULTRA-NEW

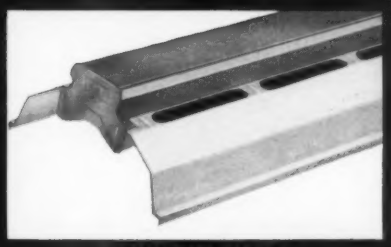
POWER-LUME



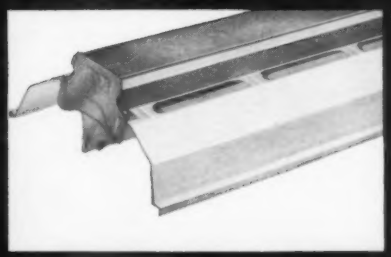
gets the most out of the new

POWER-GROOVE

LAMPS



POWER-LUME F



POWER-LUME V

Distributed exclusively through electrical wholesalers

Delivers **TWICE** the amount of lumen output per foot of lamp length!

Today's big news in industrial lighting. 2 outstanding Wheeler units — Power-Lume F and Power-Lume V — specifically designed to utilize *fully* the extra illuminating power of the new Power Groove Lamp. Both fixtures are designed for all medium to high mounting applications . . . provide more comfortable seeing, cooler lamp operation, thanks to Wheeler's unique diffuser apertures that direct MORE than 20% of the light upwards.

POWER-LUME F (porcelain reflectors) are ideal for use where rough work is being performed and shielding is unimportant. Where reduced brightness is required, Power-Lume F with aluminum reflectors does the job best.

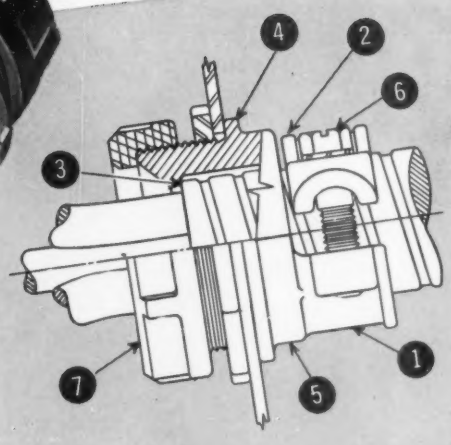
POWER-LUME V (with drawn one-piece porcelain reflectors) with increased shielding is the perfect lighting answer for those areas where more difficult seeing tasks are being performed. For maximum seeing comfort, Power-Lume V with drawn one-piece aluminum reflector is recommended.

Write for New Product Data Sheet No. 100 D
NEWEST UNIT IN WHEELER'S "PACKAGE PLAN" LIGHTING

WHEELER REFLECTOR CO. (Division of Franklin Research Corp.)
275 Congress St., Boston, Mass.

from every angle–

O.Z. TYPE "PK" is the clamp



1. Special Aluminum Alloy body and clamping cap for strength and corrosion resistance.
2. Armor clamped several turns from end.
3. Smooth armor stop assures termination at proper point—protects cable insulation from sharp, rough edges.
4. Flange on body eliminates locknut outside of cabinet.
5. Large hex facilitates installation.
6. Slotted hex-head clamping bolts can be tightened by wrench or screwdriver.
7. Strong O.Z. Type A hi-impact phenolic insulating bushing.

Here is a clamp designed specifically to meet the requirements of interlocked armor cable applications. The O. Z. Type "PK" Clamp provides exceptional speed and ease of installation, whether your cable enters the cabinet from the top, bottom or side. It is available for interlocked armor cable ranging in size from .45" to 4.28" O. D.

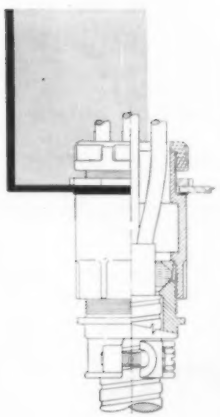
Distributed exclusively through electrical wholesalers

WHEELER REFLECTOR CO. (Division of Franklin Research Corp.)
275 Congress St., Boston, Mass.

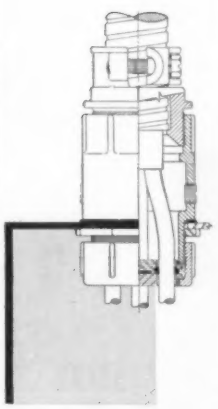
for ARMORED CABLE

combines with standard O.Z. fittings for any terminating or splicing job involving INTERLOCKED ARMOR CABLE.

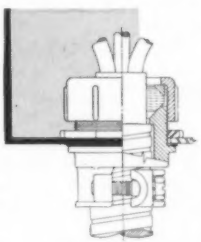
Seals cable ends to protect insulation against moisture and other contaminators—can also be used with threaded hubs and bosses to provide watertight cable entrances.



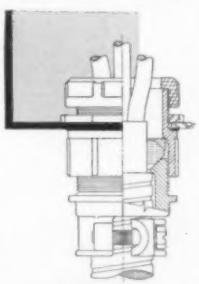
TYPE "PKC"
Compound type terminator for interlocked armor cable entering bottom of cabinet.



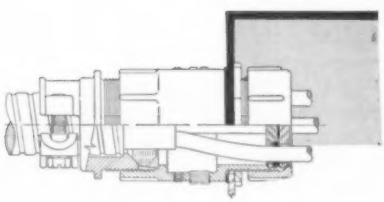
TYPE "PKT"
Compound type terminator for interlocked armor cable entering top of cabinet.



TYPE "PKG"
Sealing gland type terminator for interlocked armor cable entering a cabinet.



TYPE "PKS"
Provides watertight cable entrance seal in any position. Can also be used as a compound fitting in upright position.



TYPE "PKH"
Compound type terminator for interlocked armor cable entering side of cabinet.

TYPE "PKJ"
Splicing fitting for interlocked armor cable.

For complete information on these and other O. Z. Fittings for use with Interlocked Armor Cable, write for Engineering Bulletin 135A.

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- CONDUIT FITTINGS
- INTERLOCKED ARMOR CABLE FITTINGS

Contractors tell how

Senior estimators earn share of company profits

By Jack Stone

President
Jack Stone Co., Inc.
Arlington, Va.

◆ OUR SENIOR estimators are on a salary and percentage-of-gross profits pay plan that has worked out fine for both company and personnel. Job volume is higher and estimators are happier because of it. It places responsibility on them in planning jobs for seeing that every man in his bailiwick is producing and that a fair amount of return follows. He shoots for a set gross quota. Jobs are better managed from inception to completion because the estimator is given so much free rein to handle a job competently and profitably in accordance with his ability and experience.

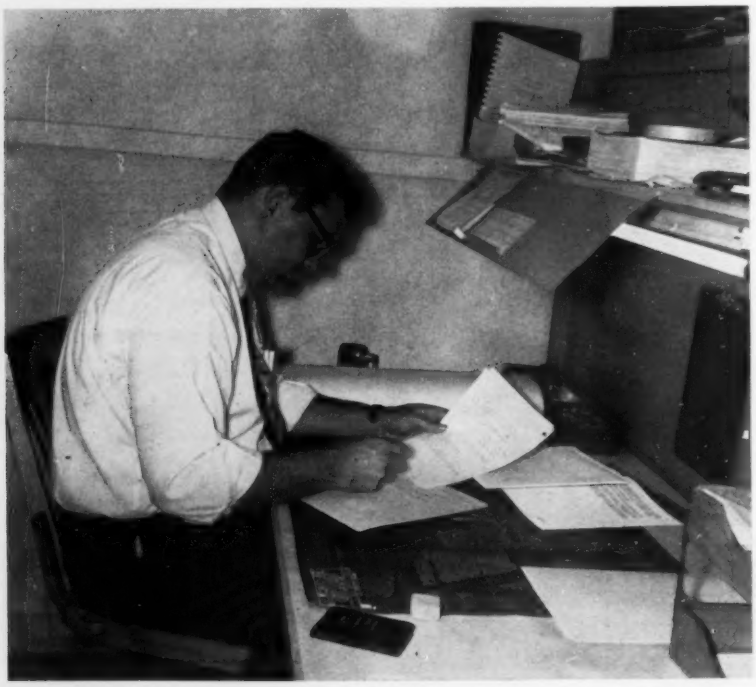
For example, if he is buying special metal work which metal shops other than our own are capable of producing, he is free to sub-contract work out to other shops if prices are better. If he turns the job over to our metal shop, he has to satisfy himself that the prices of our shop superintendent are better than competition.

Similarly our metal shop foreman works on the same basic pay plan. If he takes on a job of fabrication for another department, it must be on a profitable basis.

Our three senior electrical engineers doing our estimating on this plan are capable of operating their own businesses. They put to practice the combination of skills it takes to run a business successfully. They work much harder, longer hours, frequently taking work home. They put all of their talents, know-how, and business acumen into carrying through a contract. Their earnings are high and their responsibility greater.

They are happier than if they were on straight salary alone. (Junior engineers in the estimating department are not included in the plan.)

Our oldest estimator probably attests to the success of the plan in his length of service: he has been with us for 26 years.



Jack Stone Company senior estimators are given free rein to carry through a job as profitably as their know-how and ability permit.

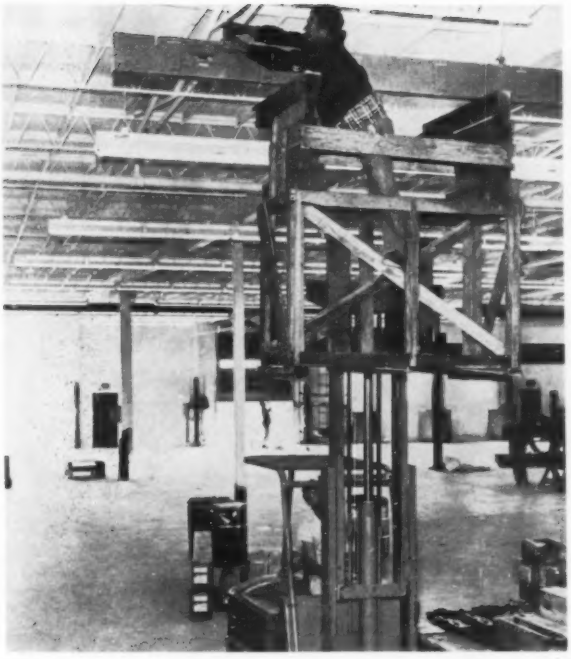
Sell service, not low price

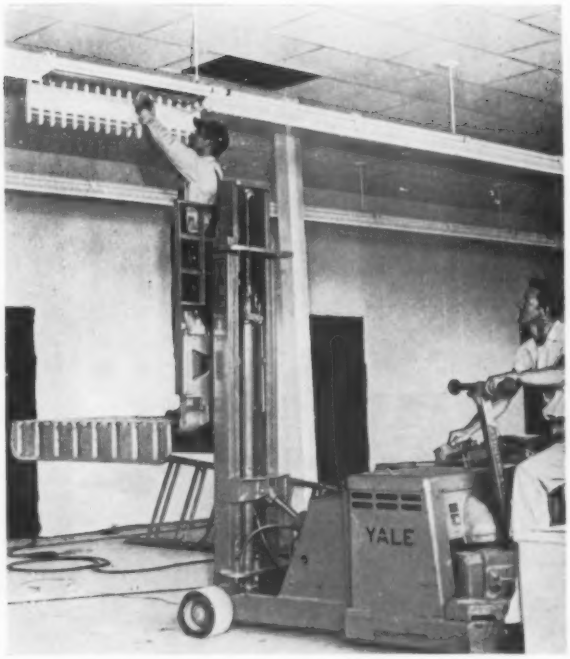
By Victor V. Kuhl, Sr.

Electrical Contractor
Victor V. Kuhl & Son
St. Petersburg, Fla.

◆ WE SELL SERVICE on the job, rather than *low price*, and we won't undertake any more work than we can handle speedily. Thus we're able to render instant service to the customer who is willing to pay the price we ask. If the customer needs fast service, our experience is that he'll pay—and he'll also remain our customer.

In our estimates, we invariably go by the National Pricing Service,





Lift trucks speed electrical installation at ceiling level

◆ Electrical contractors are reporting favorably on their experience with industrial lift trucks in the installation of ceiling units such as lighting fixtures and wiring ducts.

At left above, a lift truck is being used to install electrical busway in a large industrial plant. In this instance, a special scaffolding platform was rigged to be picked up on the forks of the truck. It lifts each 350 pound section of busway into place as well as providing a working platform for the electrician.

---

since estimates based on these figures will stand up in court, in case of litigation. Besides, if pricing out time and material by the book is $75, and we set up a charge of $100, we figure we've made an additional $25. This means that by using the pricing system, the contractor can forget all about his overhead, since he can't go wrong submitting a figure based on the system.

Price every job for profit

By pricing everything out at the selling price, I know that if our estimate lands a job on the prices the book calls for, I'm certain to make money. We never figure a job that'll lose money for us. If we get the job, okay; if not, let the fellow have it who is cutting corners and endangering his financial health.

There are millions of dollars' worth of wiring jobs on which contractors are making little, if any profit. These businessmen are afraid to charge the proper amount for labor and materials, and they're not inclined to use manufacturers' list prices in compiling estimates.

That, I can't see. We do a six-figure gross via our method of holding the price line. It works out this way: If you go in to buy a pair of $20 shoes, $20 is the price and you, as a customer, don't argue about it. Similarly, when an auto agency repairs your car, you pay the bill asked. On the same premise, the electrical contractor must hold the line on his prices if he is to survive this period of profitless prosperity.

Sometimes, in their anxiety to land a contract or get a bid in, contractors make the dismal mistake of not checking the job thoroughly beforehand. For example, upon several occasions we've been, perhaps, the third or fourth contractor on a job. In checking on the service location, we've called the electric utility, only to find that we were the first to do so. Yet the service location may run far above the cost figured on the load which the service must be designed to carry. The plan may not show the location of the service drop, or how long the run is, and it may be a scant ten feet or extend out to 50 feet. Yet some contractors don't check this important item.

No bids on outlet basis

Another thing we shy away from is figuring on a per-outlet basis. No two jobs are alike, and the distance between outlets is subject to wide variation. It's only safe to figure on a per-outlet basis if you charge enough for it.

It's mighty important to have adequate supervision on the job, along with an intimate knowledge of your workers' capabilities. By knowing the type of job you're bidding on, together with the kind of men, or supervisory personnel, available for the job, you can better estimate it.

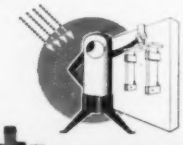
How imperative the need for proper supervision is seen in the instance of one job where labor cost ran 45 per cent; the material cost 55 per cent. On an almost similar contract that was not adequately supervised, labor costs rose to 70 per cent against a material cost of 30 per cent."

DEPENDABLE OUTDOOR LIGHTING CONTROL

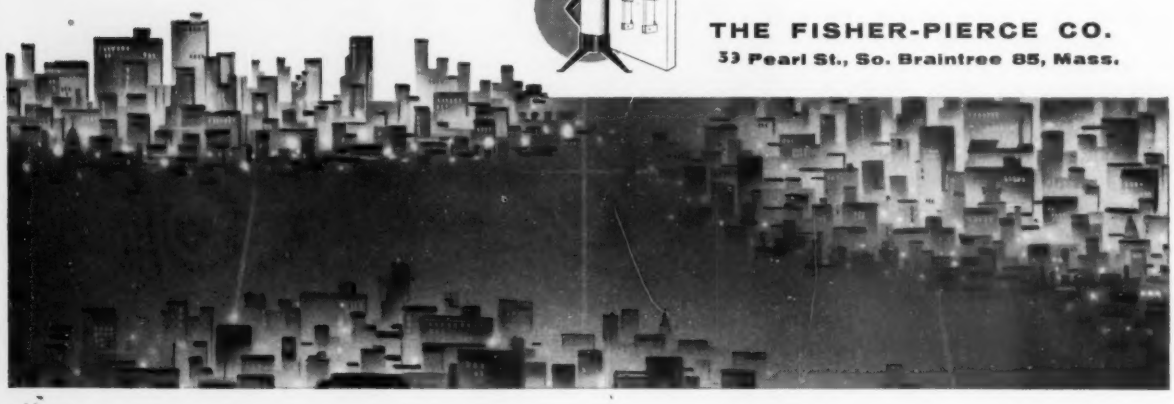
.....from coast to coast

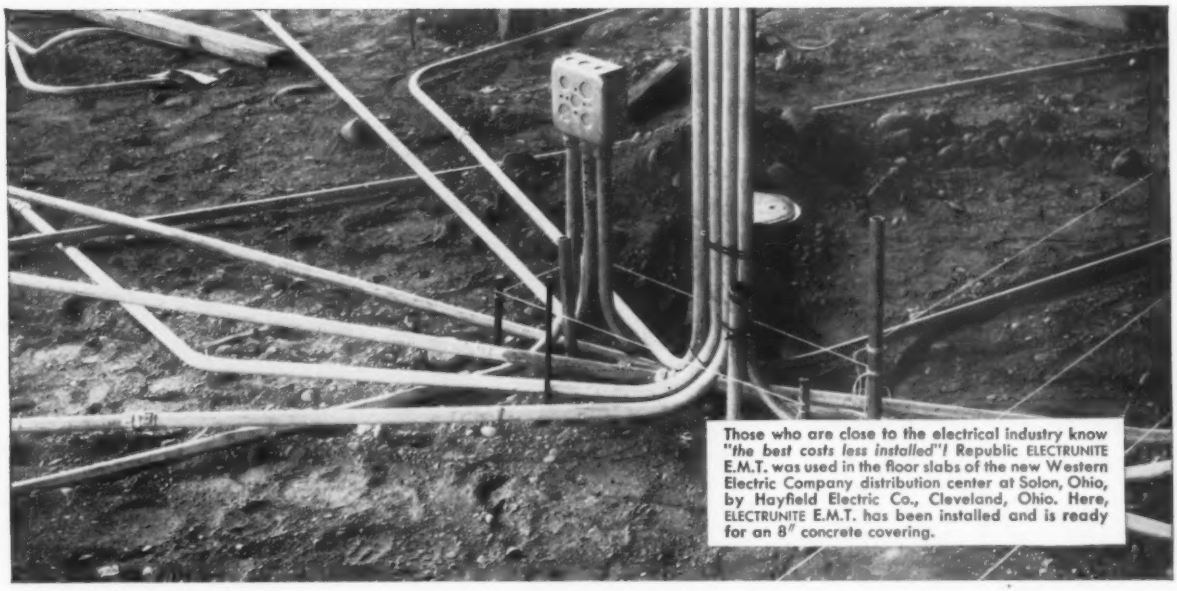
Throughout the United States, Fisher-Pierce units have provided more hours of dependable street light control than any other make of photoelectric control. For more than twelve years Fisher-Pierce has set the pace in the development and manufacture of photoelectric controls for all types of outdoor lighting.

Today Fisher-Pierce, backed by an organization of 600 people, offers unlimited facilities for the development of new controls and allied products for the electric utility industry . . . as well as the extensive service organization that stands behind each F-P control. Whether your requirements call for proven lighting controls for any type of outdoor lighting, development of new electric or electronic products, or engineering service in the installation and maintenance of lighting control systems . . . call on Fisher-Pierce.



THE FISHER-PIERCE CO.
53 Pearl St., So. Braintree 85, Mass.





Those who are close to the electrical industry know *"the best costs less installed"!* Republic ELECTRUNITE E.M.T. was used in the floor slabs of the new Western Electric Company distribution center at Solon, Ohio, by Hayfield Electric Co., Cleveland, Ohio. Here, ELECTRUNITE E.M.T. has been installed and is ready for an 8" concrete covering.

THOSE WHO ARE CLOSEST TO THE ELECTRICAL INDUSTRY . . . SPECIFY

Republic ELECTRUNITE E.M.T. because they know

The Best Costs LESS INSTALLED

And here's why . . . Republic ELECTRUNITE® E.M.T. is produced from flat-rolled open hearth steel made in Republic's own mills, and inspected to Republic's rigid requirements. When received at the tube producing mill, this steel must meet all chemistry and mechanical requirements, after which it is formed and Electric Resistance Welded into this modern steel raceway.

Built into the ELECTRUNITE process are galvanizing techniques that assure tight adherence of the coating, providing full-length protection that will not chip, peel or flake-off during bending and will remain intact for years.

ELECTRUNITE E.M.T. is engineered to provide easy installation by adding to the popular sizes "INCH-MARKS" and "GUIDE-LINES". These make accurate bending easy with bends all in the correct plane. A knurled inside surface in the popular sizes makes wire pulling up to 30% easier. These "built-in" features are aimed at reduction of overall installation costs. The combination of features and accurate tolerances coupled with the right steel for the right job assures ELECTRUNITE VALUE.

That's why we say . . . "The *Best* Costs *LESS* INSTALLED"!

Again, those who are close to the electrical industry know *"the best costs less installed"!* Soden Wholesale Electric Company, Inc., Republic ELECTRUNITE E.M.T. distributor at Riverside, California, knows. Above, is a view of their modern 25,000 square foot concrete warehouse located on a three-acre site. Republic ELECTRUNITE was used exclusively.

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Code for general wiring are listed under other special conditions ture, is important to the under-

Understanding the Code

By Walter R. Stone

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors ✔
- Industrial Engineers ✔
- Consulting Engineers ✔

◆ THE NATIONAL Electrical Code in its entirety is hard to understand at first. Some passages remain difficult even after much study. That is why some contractors are astonished when the electrical inspector looks at their jobs and then shakes his head. Lack of Code knowledge can cause loss of contracts, loss of profits on jobs awarded, loss of property, and loss of life, to say nothing of loss of friendship and hurt feelings.

An attempt will be made in this feature each month to help you in the electrical industry to understand the Code. It might well be called the ABC of the NEC, for every effort will be made to clarify its vague rules and exceptions to the rules which are found to be so troublesome. You are invited to send in any questions or problems which you would like discussed. These, as a general rule, will be answered in the order received.

The importance of some sections of the Code is easily overlooked. An innocent-sounding rule, such as section 1109, is often skimmed over unnoticed. Yet, the purpose of that single sentence is to control a frightening condition.

A tongue twister, on the other hand, such as 2351-b, can cause a peaceful snooze while the book slides gently to the floor, or it can cause a sailing of the book hard against a wall, depending on the disposition of the mortal who is attempting to read it. Yet, it is, on the whole, quite easy to abide by, though costly if not heeded.

And a furtive sleeper, such as section 2551, if overlooked, can mean the difference between profit and bankruptcy.

All of these Code rules and many others will be discussed in future issues. Before we begin, however, I would like to fuss a little—not at you, but at your competitor!

Inconsistent attitude

The contractor who complains that certain rules are unfounded and completely unreasonable is frequently the same contractor who, on other occasions, and just as vociferously, has demanded that local rules be set up more restrictive than the Code rules. It is not my mission to criticize those who want to exceed Code requirements. I, personally, favor superior design, keeping in mind always that the Code is a minimum standard.

What is to be deplored, in my opinion, is the wishy-washy practice of rejecting parts of the Code as being too lenient and other parts as being too strict. Let us first of all bring all of our jobs in every respect up to Code standards—all Code standards. Then, if we wish to go a step or two further and exceed Code standards, well and good.

The point is, if I cite a recently discussed Code rule requiring the basement of a single family dwelling within a 20-foot radius of a gasoline dispensing island to be wired as a Class I hazardous location, don't let me hear you "nothing - but - conduit - no - sheathed - cable" advocates complain that the rules are too unreasonable.

Another point is this: It is better for a bar and lounge, say, to be wired with multi-outlet assemblies, even of the non-metallic type, by a competent electrician with ample receptacles for the dozens of portable electric signs than to have one or two receptacles installed in rigid conduit by the electrician and the dozens of additional ones roped in by the bartender or the beer distributor with lamp cord. The bartender-wired jobs which I have seen carry greater wallops and will knock you out quicker than the drinks which they serve. Besides, the practice deprives the contractor of the extra money he needs with which to buy the drinks. It might be well, then, to become familiar with all of the approved wiring methods in order to take advantage of the most lucrative in each instance and still perform Code grade work or better.

This brings us to a very important question: How am I to know whether the kind of wiring method which I would like to use in a particular case is approved?

The answer is that all of the wiring methods approved by the

About the author

Walter R. Stone, author of the accompanying article, is well known as an expert on application of the National Electrical Code. Previous to his present employment as assistant chief electrical inspector for the New York Board of Fire Underwriters, he was for many years chief electrical inspector for the city of Fort Worth, Texas. He has a background of twenty years experience in the electrical field and holds a master electrician's license as well as a marine engineer's license. He studied at Columbia and Texas Christian Universities.

These discussions of the Code are presented as a means of stimulating thought on Code application, and helping the reader to obtain a better understanding of Code rules and regulations. Despite the author's broad experience, the discussion presented here represents his personal views on the subject matter and is not an official interpretation of the Code.

Readers are invited to submit questions on the Code for discussion in this department. Address all communications to Code Editor, ELECTRICAL SOUTH, 806 Peachtree St., NE, Atlanta 8, Ga.

Code for general wiring are listed in Chapter 3. First, look in the Table of Contents and see if the type wiring which you want to use is listed there.

How to use the Code

Suppose, for instance, that you have Type UF underground feeder and branch circuit cable which you wish to bury directly in the earth as service entrance conductors for a small residence. Running down the Table of Contents under Chapter 3, you come to Article 339 which lists your type of wire. That means it is approved for *some* kind of installation.

Next turn to the page number of Article 339 and find *Use* under section 3392. There you will find that you can bury the wire directly in the earth provided that it is used as a feeder or as branch circuit conductors and is provided with overcurrent protection not in excess of its carrying capacity. In many cases it will have to be protected from mechanical injury.

In the second paragraph, however, you find that it is *not* approved for use as service entrance conductors. So in this case you cannot use it the way you intended. (You can use Type USE which is approved as underground service entrance conductors).

The rule just discussed is very elementary, but is overlooked more often than not. It cannot be over emphasized that a *first requirement* to understanding the Code is to become familiar with its form and layout. Such understanding will dispel most of its vagueness and make less vexing the task of locating particular rules. The general layout is explained very clearly in the Introduction under the sub-heading "Code Arrangement." There you will find that the first four chapters are the basic general rules for all general wiring requirements.

Supplemental chapters

Chapter 5 is devoted to Special Occupancies which by reason of the special nature of the occupancies constitute additional hazards, such as the presence of explosive gases or inflammable films, etc. The controversial Article 500 is included in this Chapter.

Chapter 6 is devoted to Special Equipment, such as electric signs, elevators, X-ray, and other special equipment. Chapter 7 governs Special Conditions, such as high voltage, outside wiring, and wiring under other special conditions.

Chapters 5, 6, and 7, then, amend or supplement the general rules set down in the first four chapters because there is something special to be considered about each of them.

Chapter 8 governs Communication Systems and consists of independent rules for these circuits, including radio and television equipment, except for an occasional reference to earlier chapters. Chapter 9 governs Construction Specifications or manufacturers' requirements. Chapter 10 consists of the all-important Tables as well as Diagrams and Examples.

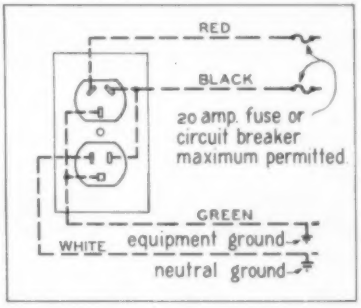
The time devoted to becoming familiar with how the Code is arranged will compensate many times over for the time otherwise lost in frustrated unsystematic searching. The entire Introduction to the Code should be thoroughly studied before proceeding further.

The introduction to any book, especially one of a technical nature, is important to the understanding of that book. The Introduction to the Code is no exception. Rather, it is most important. So, too, are the definitions.

Questions on the Code

QUESTION: When a combination 220 volt receptacle and a 115 volt receptacle are combined into one

(Continued on page 106)



Code test questions

Let us pause for a check of our knowledge before we proceed further by answering as many of the following questions as possible: (Correct answers will be found at end of article.)

1. Compliance of the Code will result in an installation essentially free from hazard, but not necessarily adequate for good service. True or false?

2. The Code does not cover industrial substations and outside conductors adjacent to such premises. True or false?

3. The first 4 chapters of the Code apply to chapters 5, 6, and 7 except as amended for the particular condition. True or false?

4. The latest edition of the Code should always be used. True or false?

5. A covered conductor is one having one or more layers of insulation. True or false?

6. An explosion-proof enclosure is required to be so designed that explosive vapors:

a. cannot enter the enclosure.

b. once ignited within the enclosure cannot escape to the outside again.

c. if exploded within the enclosure, will not damage such enclosure nor escape therefrom until sufficiently cooled to prevent them from igniting the surrounding atmosphere. (Check only one answer: a, b, or c; the one which you believe to be most nearly correct.)

7. The identified conductor is:

a. one which is distinctly marked.

b. the white grounded conductor.

c. the conductor having the highest voltage to ground and called the "high leg."

a? b? c?

8. An isolating switch:

a. has no interrupting capacity and is intended to be operated only after the circuit has been opened by some other means.

b. is capable of interrupting its rated current at its rated voltage.

c. is capable of interrupting the stalled rotor current of a motor.

a? b? c?

9. A thermal cutout:

a. is not designed to interrupt short circuits.

b. is designed to interrupt short circuits.

c. is not designed for overcurrent protection.

a? b? c?

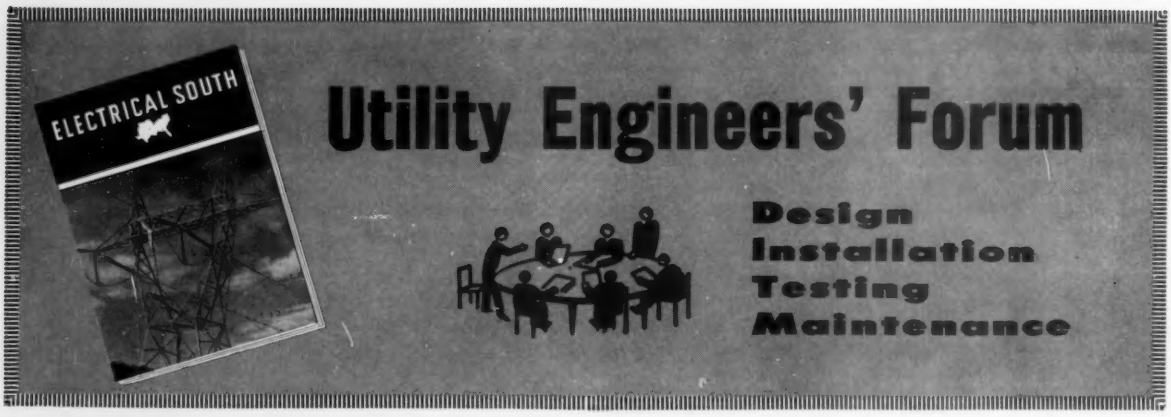
10. The voltage to ground in ungrounded circuits is the greatest voltage between the given conductor and:

a. the earth or a grounded object.

b. any ungrounded object.

c. any other conductor of the circuit.

a? b? c?



Simple tests replace periodic circuit breaker maintenance

By E. R. Perry

Allis-Chalmers Mfg. Co.
Dallas, Texas

◆ WHILE PERIODIC maintenance on large outdoor breakers has always been standard practice, actual testing is a more positive method of determining circuit breaker condition. Experience has shown that often more harm than good is done in breaker maintenance by partial disassembly.

Failure to reconnect a blowout coil on an air-magnetic circuit breaker or failure to replace an interrupting device correctly on an oil circuit breaker can result in serious consequences. Less serious assembly mistakes during periodic maintenance work are much more frequent, and yet these, too, could be eliminated at a considerable saving in cost by performing simple tests on the circuit breaker.

Three functions checked

There are three functions of a circuit breaker which must be checked:

1. Mechanical — timing, adjustment, and operating characteristics.
2. Current - carrying ability — contact resistance, shunt and bolted electrical connections.
3. Dielectric strength — bushings and interrupting medium, i.e., oil.

Testing a circuit breaker's mechanical condition is relatively simple and can be done with accuracy. The test makes use of a direct-acting speedgraph taken from a recorder such as that shown in Figure 1. A direct-acting speedgraph is recommended rather than one with reducing heads, because it will provide more complete and accurate results when it is properly interpreted. A speedgraph not only indicates when mechanical difficulties are present, but also isolates the cause of the difficulties.

When a circuit breaker is first received from the factory, or when an older circuit breaker is being maintained, a thorough check for proper adjustment and a visual check for loose nuts or linkages are good practice.

Immediately upon reassembly of the unit, a speedgraph should be taken for use as a master for future comparison. Where speedgraphs are available from the breaker manufacturer, they should be used as the masters. These masters should be filed and used for comparison for future speedgraphs on that particular circuit breaker.

Tripping and closing voltages should be checked before testing to make certain they agree with the master speedgraph record.

Speedgraph tests are taken on the phase or pole closest to the operating mechanism so that an accurate check on the operating mechanism itself is obtained. Speedgraphs taken on phases remote from the operating mechanism show certain inconsistencies due to linkage vibration and slack which make interpretation difficult. A slight change in characteristics foretells the possibility of more serious trouble in the making.

If a more thorough check is desired, speedgraphs should also be taken on poles remote from the operating mechanism. These additional speedgraphs will provide a check on the shock absorbers, overtravel stops, and adjustment of the other two phases. Speedgraphs taken on other than the phase closest to the operating mechanism cannot be interpreted as critically and should be compared only with master speedgraphs taken on the same pole.

Any deviation from the master, in subsequent speedgraph curves, shows some change in the mechanical operating characteristics of the circuit breaker. Proper interpretation of the curves indicates whether or not these changes are critical and what maintenance, if

any, should be performed. The following methods of checking the mechanical condition of a circuit breaker hold true for air as well as oil breakers, and interpretation of speedgraph curves is accomplished by consideration of several zones, as shown in Figure 2.

Speedgraph interpretations

Zone 1, concerning the trip mechanism, is the most critical of the zones. Any deviation in the test curve from the master speedgraph in this area should be investigated. Deviation between time zero and when the contacts first start to move will be caused by a change in trip voltage or sticking of the trip latch. Deviation during the rest of Zone 1 will be caused by the mechanical or pneumatic trip-free mechanism.

Zone 2 is a semi-critical zone. Arc interruption usually takes place in this area during the first four or five inches of travel after the contacts part on oil circuit breakers. Interrupting devices are designed for a specific contact part velocity. This velocity should not vary significantly from that measured at the time of breaker installation, and a change of more than plus or minus 10 per cent should be investigated.

Any slowing down of contact velocity within this zone can be caused by lack of lubrication causing binding in the operating mechanism, improper setting of the tail spring compression, a permanent set in the tail spring, or binding in the mechanical linkage. However, lack of lubrication or "gumming" of the operating mechanism is by far the most common cause. Extreme variations in temperature between the master and test speedgraphs will show a slight change in velocity. Factory speedgraphs are made at approximately 72 F.

Zone 3, shown in Figure 3, is the deceleration zone. This zone is not normally critical, but on large oil circuit breakers, 14.4 kv and above, the curve should be smooth and tapering, as shown in Figure 2. The shock absorber is contacted at the point where the curve begins to bend at the entrance to Zone 3.

If the test curve falls below the master curve, there is probably insufficient oil in the shock absorber. If the test curve lies above the master curve, the shock absorber orifice may be clogged. On large oil circuit breakers, 69 kv and larger, this zone could be considered critical, as failure to decelerate properly could result in broken lift rods or crossarms.

Reclosing changes

During a reclosing operation, any change in the curve during reversal of direction will indicate a change in the "b" switch setting or a change in the control-valve function when *Pneu-Draulic* or pneumatic operation is used. The point at which the "b" switch closes should be marked on the master speedgraph. This is done by placing a bell or light across the "b" switch and slowly lowering the breaker contacts until the switch closes. At this point the contacts should be held stationary and a line made on the speedgraph.

Fig. 1—Three speedgraph tests will indicate the condition of this 10,000-mva, 3-cycle, 1,200-amp breaker without requiring disassembly of the unit.

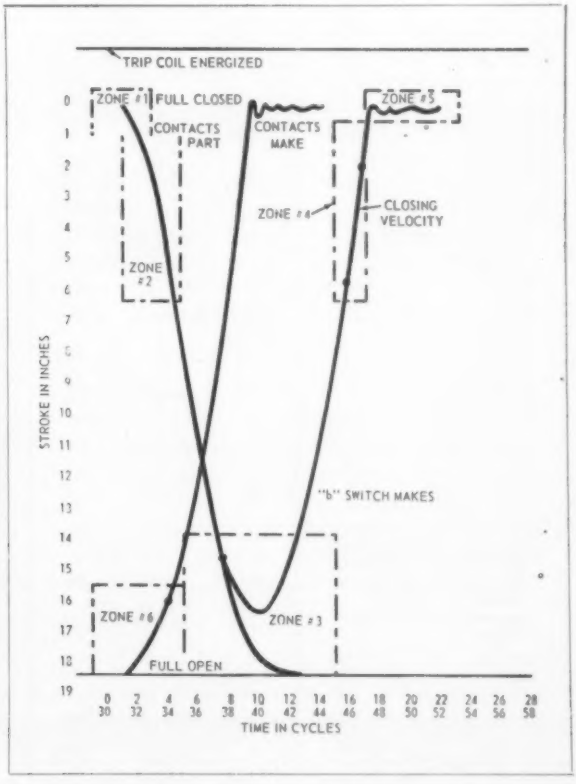


Fig. 2—Breaker operation is divided into zones to simplify interpretation of tests. This chart shows closing, opening, and reclosing characteristics.

Zone 4 is the contact-make zone. Any sharp deviations from the master speedgraph indicate interference with the contacts. If this occurs, the circuit breaker should be opened and the contact alignment checked. Contact-make velocity should be measured in this zone as follows: Measure velocity between points one inch down from contact-make on the curve, and one cycle previous to this point on the curve. A decrease in contact-make velocity of plus or minus 10 per cent is considered significant and should be investigated.

Zone 5 is controlled by the overtravel stop. Any increase in amplitude indicates a change in the overtravel stop adjustment. On most circuit breakers the overtravel stop is made easily accessible because it takes greater punishment than any other adjustment. A variation in amplitude of more than ¼ inch on a large circuit breaker should be checked and readjusted. A change in the damping of the bounce indicates a possible destruction of the resilient overtravel stop.

Zones 4 and 5 can also be checked by the use of a closing curve. Closing curve characteristics will not necessarily match up with the characteristics of a reclosing curve. Succeeding closing curves should match very closely, with no more than a plus or minus 10 per cent variation.

Zone 6, the area covering the beginning of the breaker stroke on a single close operation, should also be considered.

Any deviation from the master curve will probably be in the slow direction. This indicates a sticking control valve, sticking solenoid or a high resistance in the control circuit. Contacts in the closing circuit can develop high resistance due to foreign matter or deposits built up by the arcing at the contacts.

Current-carrying ability

The condition of the current-carrying components of a circuit breaker can be determined by the use of a low resistance ohmmeter reading in microhms. Limits for various ohmmeter readings on a wide variety of circuit breaker types have been published. A rule of thumb schedule of maximum values is shown in Table I.

If the contact resistance of a particular breaker measures slightly greater than the values shown, it does not necessarily mean trouble, for contact resistance varies with different manufacturers' designs and this must be taken into consideration. However, once a contact resistance test is made on a particular breaker, any large change in values over 150 per cent during subsequent tests should be investigated.

In many ways a contact resistance check is similar to a power factor test of dielectrics. A sudden change in reading is often more indicative than the actual reading. Two meters are available for this test: the *Ductor* and the *Microhmer*. It is not recommended that these meters be used interchangeably, although either meter will give satisfactory results. At least 100 amperes should be used when making these tests.

The contact resistance check is made without dropping the tanks on an oil circuit breaker or without disassembly of an air magnetic circuit breaker. On an oil circuit breaker the meter probes are placed on the bushing studs with the circuit breaker contacts closed. The contact resistance is measured by a drop of potential method. Air circuit breaker contacts are measured in much the same way as the oil breaker contacts. The air circuit breaker is removed from its cubicle and the meter probes connected to the primary disconnects. Contact resistance measurements should be recorded on the speedgraph in order to keep records readily available. If high contact resistance is encountered, it is advisable to operate the breaker once or twice and then recheck the resistance reading before disassembling the breaker.

The dielectric strength of a circuit breaker is checked by the con-

(Continued on page 54)

MAXIMUM CONTACT RESISTANCE

Air Magnetic Breakers			Oil Circuit Breakers		
Kv	Amperes	μ Ohms	Kv	Amperes	μ Ohms
5-15	600	100	7.2-15	600	300
	1200	50		1200	150
	2000	50		2000	75
			23-34	All	500
Note: Values vary with individual circuit breaker designs. Higher values measured on a particular design do not necessarily indicate an inability to properly conduct rated current.			46	All	700
			69	600	500
				1200	500
				2000	100
			115-230	All	1000

Table I—As noted above, values may vary with circuit breaker design, but once resistance tests have been made on a breaker, any large change should be investigated.

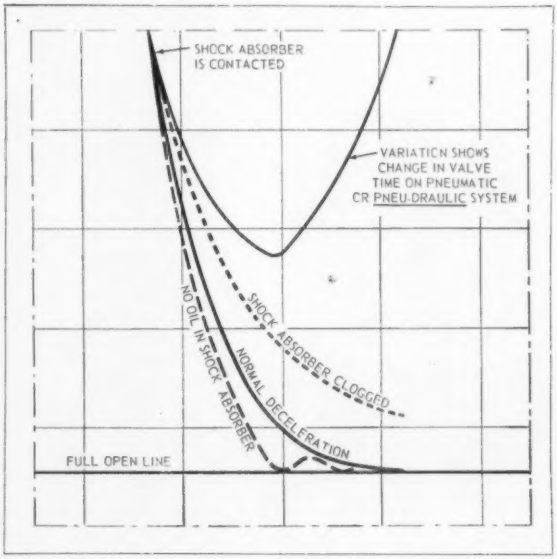
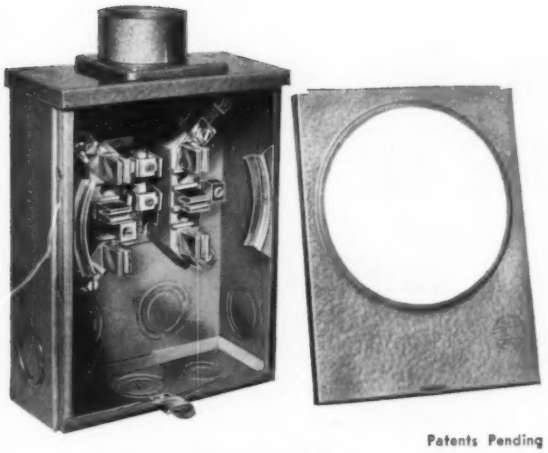

SHOCK ABSORBER IS CONTACTED
VARIATION SHOWS CHANGE IN VALVE TIME ON PNEUMATIC OR PNEU-DRAULIC SYSTEM
SHOCK ABSORBER CLOGGED
NO OIL IN SHOCK ABSORBER
NORMAL DECELERATION
FULL OPEN LINE

Fig. 3—This closer look at zone 3 shows variations that might result from improper operation of the shock absorber during deceleration.



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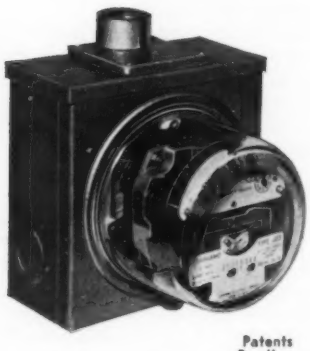

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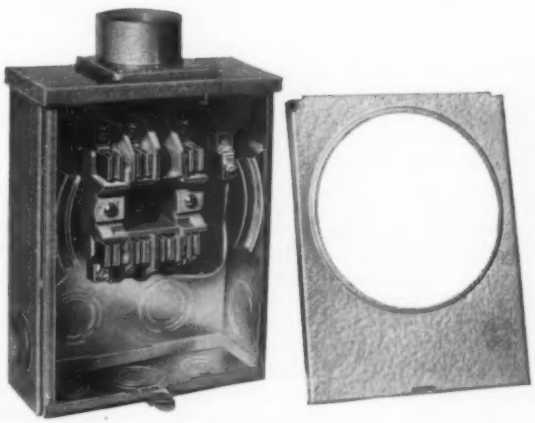

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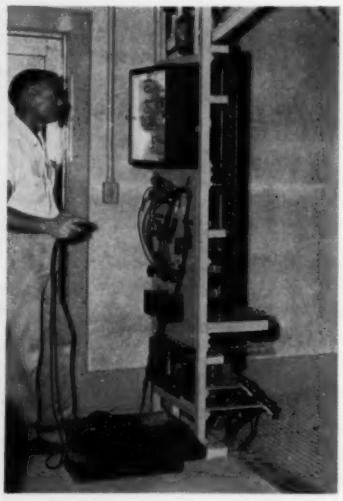

Understanding vectors as applied to apparatus connections

By E. B. Henry
Relay Engineer, Gulf Power Company
Pensacola, Fla.

Part 2

Open delta—open delta transformer connections

The open delta—open delta connection will hereinafter be called simply the open delta connection which is in accordance with accepted practice. Fig. 3 shows two sets of potential transformers, connected open delta, on opposite sides of an oil circuit breaker. The vector diagram shown will serve for either set if we omit the individual transformer lead markings and consider only leads of the same polarity.

The figure marked S may be regarded as either a synchroscope or the primary relay of an automatic synchronizing scheme. If, on the generator side, synchronism is maintained with the transmission side, the pointer of S will remain at twelve o'clock or the contacts of S will close.

An objection may be raised in that for one set, X1 is connected to a coil of S while, for the same phase, on the other side of the O.C.B., X2 is connected to the other coil. The objection is overruled by the fact that a voltage drop from C to B is being applied to S from each set.

S is not so constructed as to be able to discriminate between different marking on points of the same polarity. H2 and X2 have the same polarity; their electrical relation to each other is exactly the same as that of H1 and X1 to each other. Carrying this analogy to power transformers, one notes that the terminals with the subscript 2, will serve equally well as those with the subscript 1 for use as the leading polarity terminals in making connections. Physical locations sometimes dictate the matching of differently marked terminals.

The third voltage, represented by a dotted line of the same magnitude as the others, is the voltage that is cancelled, within the delta, by the voltage of the third transformer when added to form a closed delta. Fig. 3a shows that these voltages, in quantity and direction, have the same effect upon a load.

Tests for transformer terminals of same polarity

Instrument transformers are generally given a polarity check before being put in service. This check is usually made with a dry cell or battery of two or more cells and a d-c voltmeter. The principle is that d-c voltage applied to the two high side terminals will give rise to voltages of the same polarity at the electrically corresponding low side terminals when contact is made and of opposite polarity when contact is broken.

For an illustrative set up, assume the two inside disconnect switches of the right hand set of potential transformers of Fig. 3 closed, the two outside ones open, and the secondary fuses removed from the A and C leads. If both polarity and connections are correct it will not be necessary to disconnect any leads.

One method of verifying correctness of both is given in the directions that follow:

Connect the battery negative to the high side common; connect the voltmeter negative to the low side common and the voltmeter positive to the outside secondary terminal of the transformer connected to Phase A. Press the battery positive lead firmly against the high side A lead of the transformer. As the input positive enters the H1 terminal, output of the same polarity will leave the X1 terminal, provided all marking and connections are correct, and cause a kick of the voltmeter toward the high side of the scale; as this contact is broken the voltmeter will kick off scale in the zero direction.

Proceed similarly with the C leads and terminals H2 and X2 of the other p.t. The same results, with the voltmeter leads on the secondary terminals, will verify both polarity and connections.

In the alternating current test for leads (or terminals) of the same polarity, the transformer is connected as an auto-transformer that bucks or boosts the input voltage. This is done by connecting one high side terminal to the low side terminal on the same side and applying input voltage to the two high side terminals. The input voltage and the voltage across the high side and low side terminals that are not tied together are then compared. If the latter is the smaller, the distance between terminals of the same polarity is smaller; that is, they are on the same side, as shown in Fig. 4; if

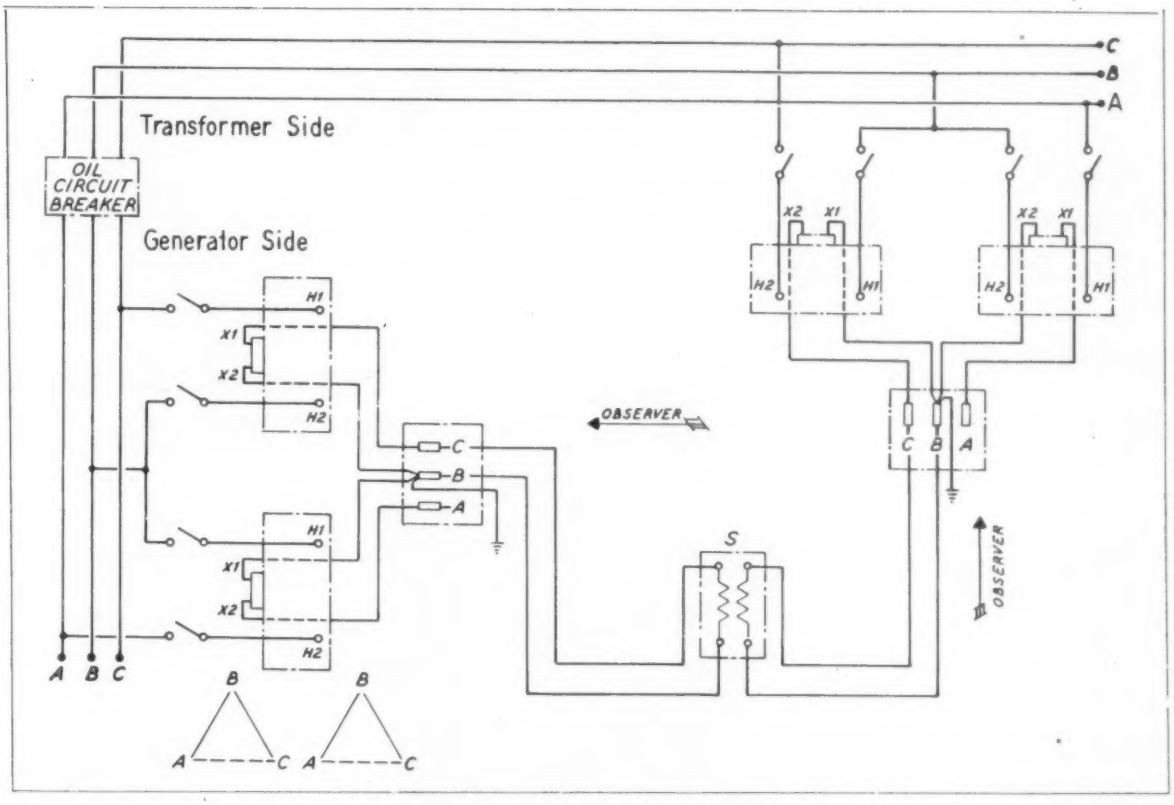

Fig. 3—Open delta connection of potential transformers.

greater, the distance between terminals of the same polarity is greater, that is, they are across the transformer from each other, as shown in Fig. 5.

Comment on obvious omissions

Throughout the foregoing some of the usual terms have been noticeably missing. Two quite acceptable terms have been omitted because "input" and "output" have a clearer meaning for a number of people than "impressed" and "induced." It is readily admitted that the latter are preferable for most purposes.

Two other much-used terms have been omitted in order to show that such terms are not necessary in the making of transformer connections. The terms "additive" and "subtractive" tend to develop the idea that there are two kinds of transformer terminal polarity, whereas transformer terminal polarity means only terminals of the same polarity.

The present trend toward deemphasizing these terms in written treatments of transformer connections is commendable*. Any explanation of them should be followed by the assurance that they are not, in any sense, qualifications, but only a loose way of defining the relative physical location of terminals of the same polarity. To this extent they are admittedly convenient in that one word can be used where several would otherwise be required.

The foregoing examples were concerned with the use of vector diagrams to ascertain connections.

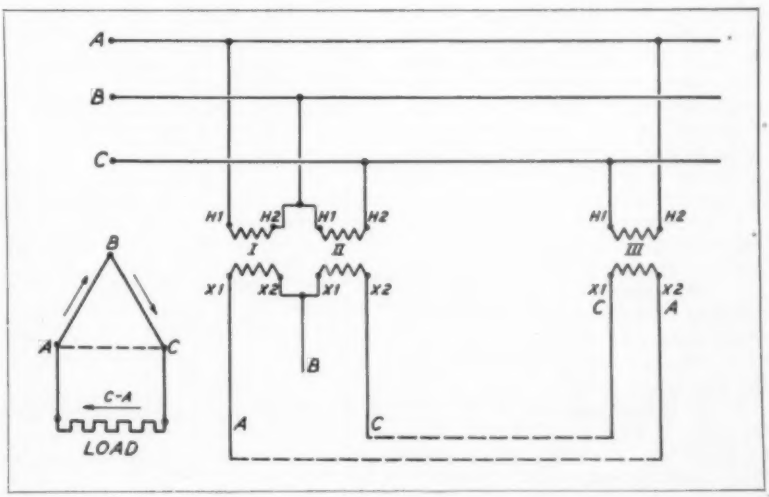

Fig. 3a—Open delta changed to closed by addition of third transformer.

*Reference: Page 146 of "The Art and Science of Protective Relaying" by C. Russell Mason.

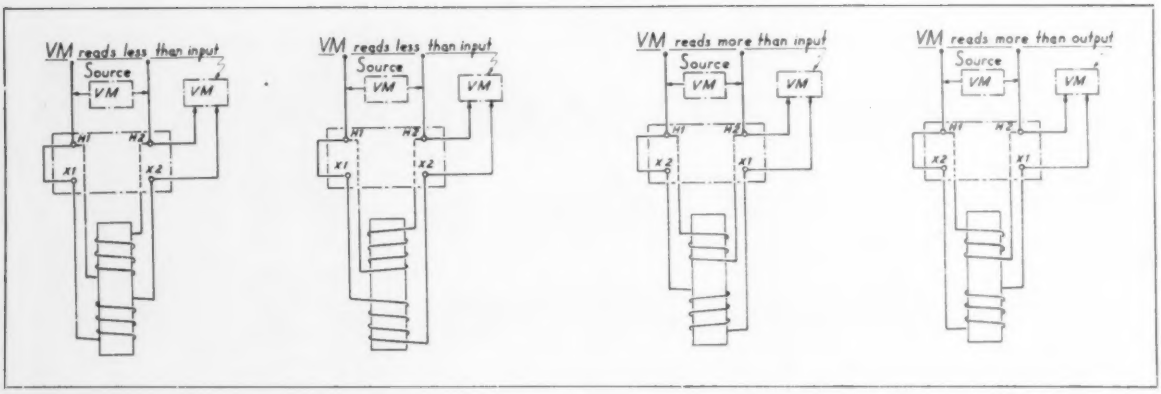

Fig. 4—Transformer leads brought out so that terminals of same polarity are on the same side.

Fig. 5—Transformer leads brought out so that terminals of the same polarity are diagonally opposite.

Analyzing transformer connections

The following two examples will show a use of vector diagrams in analyzing connections already in service and the feasibility of certain desired connections. These examples will also be exceptions as to phase sequence; this will be 3, 2, 1, which happens to be that of the system from which they are taken.

The example on the positive side will show that a three phase transformer can be connected in parallel with any existing bank of single phase transformers regardless of any apparent dissimilarity between external and internal connections.

Fig. 6 shows a setup that is known to have raised the question as to whether the existing bank would have to be reconnected in order to permit the three phase bank to operate in parallel with it. This is never necessary if the physical layout is such that any choice of high and low side connections to the three phase transformer can be made. This can be proved by the following procedure:

Copy the vector diagram from the three phase transformer nameplate as shown in Fig. 6. Draw the low side vectors of the bank in parallel with the wye of the nameplate diagram. Analyze the connections of the bank by developing the high side delta.

Small letters and arrows similar to those of Fig. 1 will aid in this analysis by showing the points that must be connected together. The result in this case is a vector diagram of the existing bank that

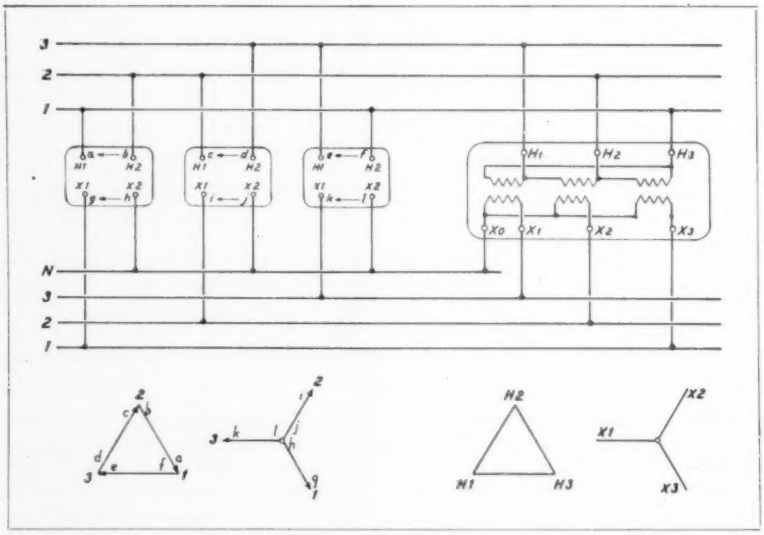

Fig. 6—Parallel connection of a bank of three single-phase transformers and one three-phase transformer on a system with a 3-2-1 phase sequence.

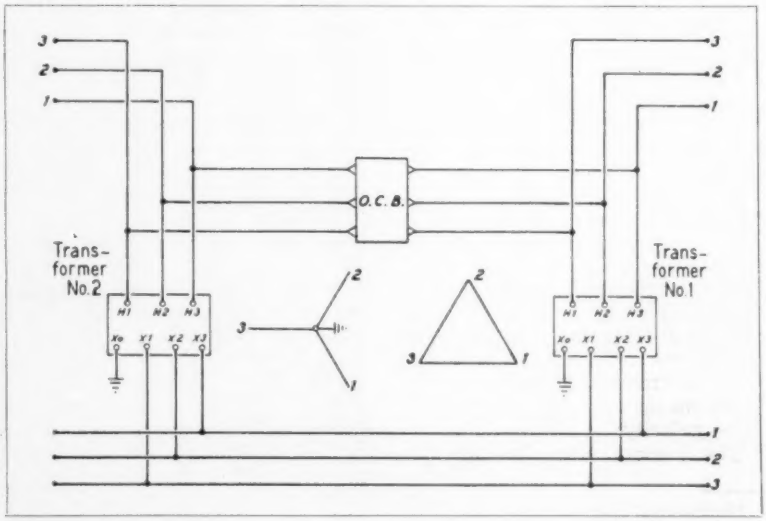

Fig. 7—Paralleling three-phase transformers (phase sequence 3-2-1).

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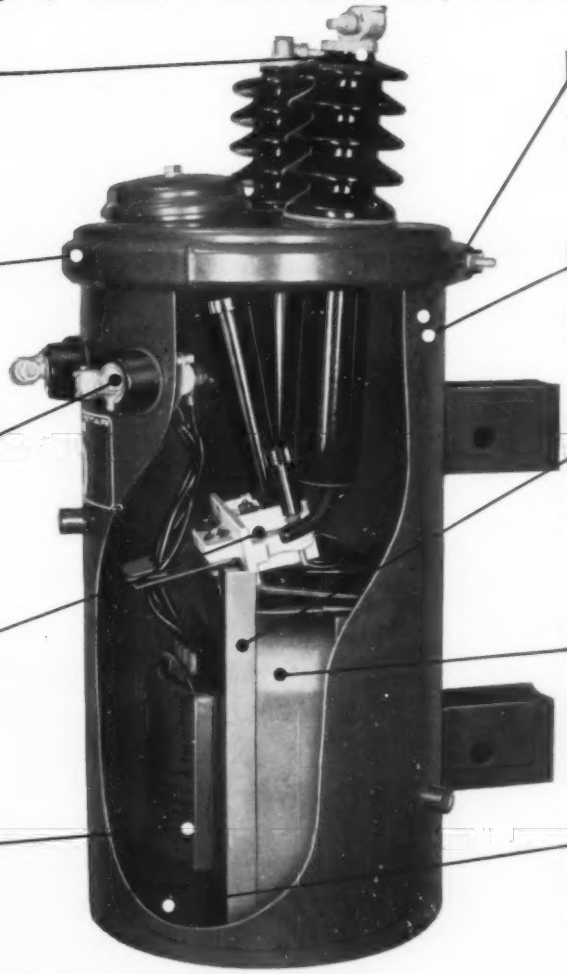

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matches that of the new transformer, provided phase 1 is connected to H3 and phase 3 to H1, and similarly on the low side.

By carefully noting the effect of the system phase sequence on the vector diagram of a three phase transformer, it can be shown that the latter can be connected in parallel with any existing bank by selecting external connections that result in the same phase displacement as that of the bank in service.

On the negative side, a question that has been known to arise in actual practice, with consequent loss of time in discussion, concerns the paralleling of two three-phase transformers.

The question: Given a transformer already in operation, can another be connected, for parallel operation, with any convenient high side arrangement of leads, and compensation made on the low side only?

One who is not conversant with the vectorial picture may point out that a considerable saving can be effected if the transmission line can be brought into and out of the station with the same phase on the outside and thus avoid the crossover shown in Fig. 7.

This saving cannot be effected. An analysis of the vector diagram, with respect to phase sequence, will show that the interchange of the positions of any two high side phases on one transformer, with the other remaining as shown, would result in a phase displacement of 60 degrees between corresponding phases on the low side. Consequently no arrangement of low side conductors could bring about an in-phase relation.

Circuit breaker tests

(Continued from page 48)

ventional methods, such as power factor, oil dielectric breakdown, and Megger tests. These tests are covered in other articles and standards to the extent that it is unnecessary to elaborate here.

During testing, the control voltages and operating pressures in stored energy operators should be checked to insure that they are at the desired levels. An external visual check should be made for loose parts or signs of deterioration; bushings should be cleaned by wiping.

Periodic testing reduces maintenance cost and results in a more accurate record of the circuit breaker's condition.

Continuity maintained

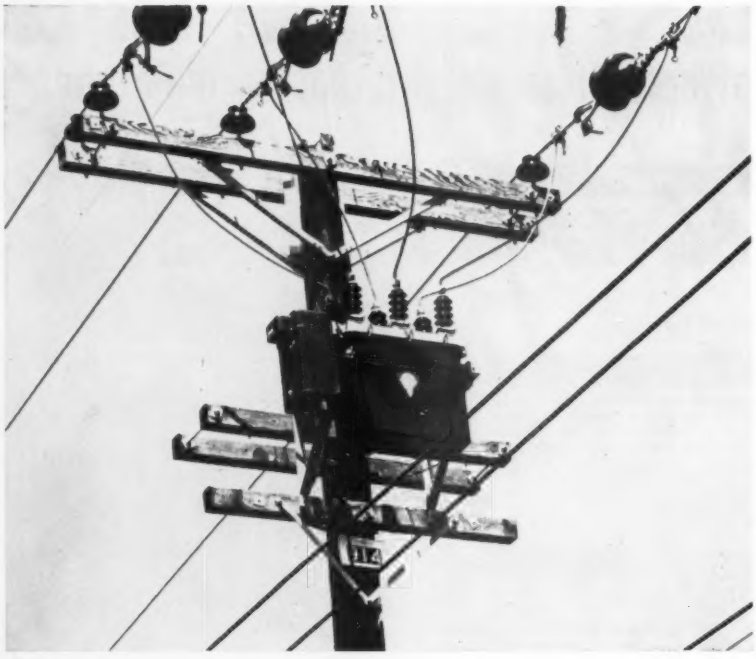


Fig. 2—One of the two pole-mounted VR switches used in the scheme.

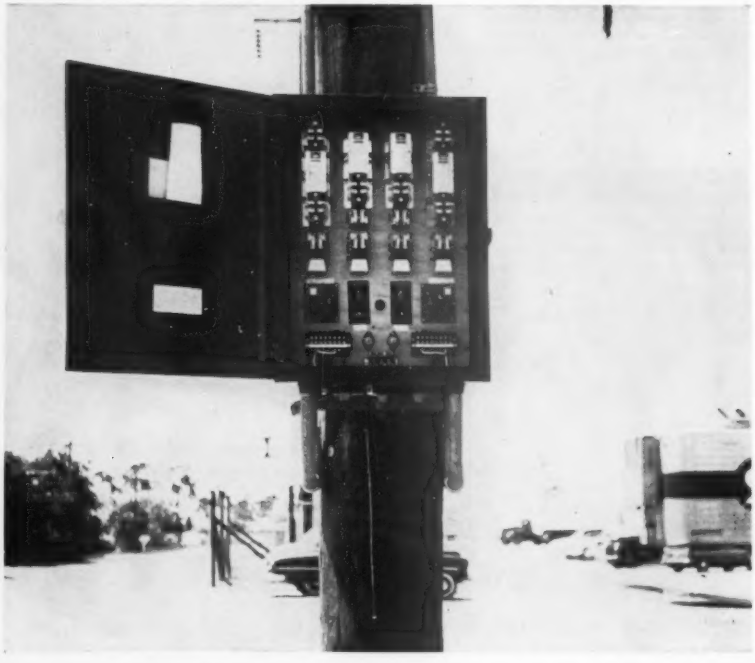


Fig. 3—The control units for the VR switches are also pole mounted.

by automatic sectionalizing scheme

By W. T. Langhurst and Lester Ulm, Jr.
Tampa Electric Company
Tampa, Fla.

◆ SERVICE continuity to a large shopping center is extremely important. Merchants and customers alike rely on electrical service to complete their transactions conveniently and successfully. Customer goodwill, revenue, and pick-up of a heavily diversified load after an outage enter consideration from the utility point of view.

To assure good service to Northgate Shopping Center, a new center having a peak demand of 2500 kva, Tampa Electric Company installed an automatic sectionalizing scheme that has proved effective. Utility engineers studying the situation originally found that the center was to be located along an existing 13.8-kv closed loop circuit involving several major substations. The engineers listed three basic requirements:

1. Eliminate service interruptions due to permanent faults on that section of the closed loop circuit serving the shopping center.

2. Eliminate all outages except those caused by faults beyond the point where the shopping center load was tapped.

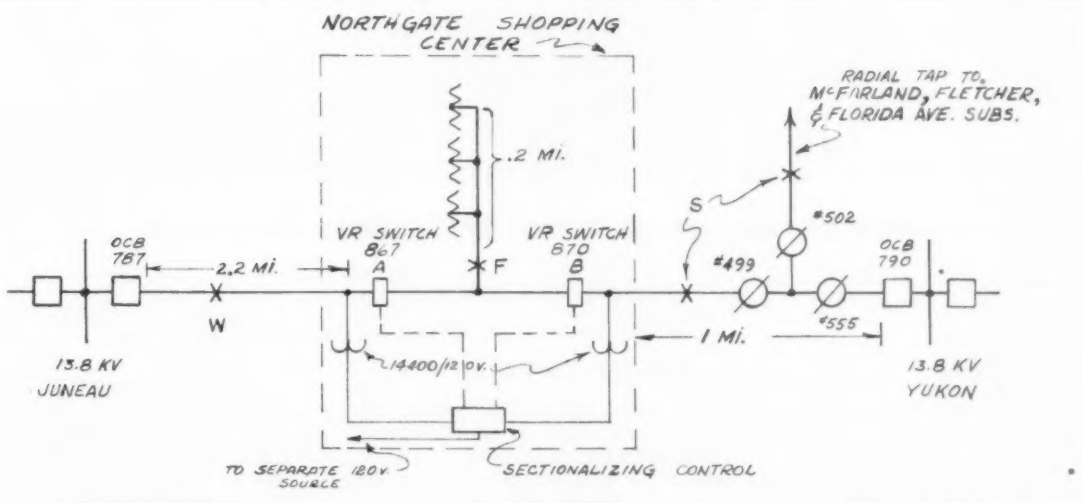
3. Install a load break device to sectionalize the line for maintenance purposes.

Several sectionalizing schemes were considered and resolved to a choice between oil switches or air break switches. An automatic scheme with oil switches and a control was worked out with engineers from Line Material Industries and selected because it offered advantages of low cost, minimum necessary maintenance, and simplicity of operation.

In addition, the oil switches would coordinate well with reclosing OCB's in the substations, and directional relaying of the breakers could be preserved. VR oil switches chosen were ideally suited because of their high short-time rating of 20,000 amperes momentary, their load break capability, and their ability to close in on a fault equal to the momentary rating.

The automatic scheme, first installed in Northgate Shopping Center, is shown in Figure 1. Pole-mounted VR switches, Figure 2, operate through the control, Figure 3, which has a separate power source. Coordination of the VR switches and OCB's is tabulated

(Continued on page 106)



Permanent Fault F

Time	Operation
0 sec	Fault occurs; OCB's 787 and 790 trip.
5 sec	OCB's 787 and 790 close, trip.
15 sec	Sectionalizing switches A and B open.
35 sec	OCB's 787 and 790 close.
45 sec	Sectionalizing switches A and B close. OCB's 787 and 790 trip.
55 sec	Sectionalizing switches A and B open and lock out.
65 sec	OCB's 787 and 790 close.

Permanent Fault W

Time	Operation
0 sec	Fault occurs; OCB's 787 and 790 trip.
5 sec	OCB's 787 and 790 close, trip.
15 sec	Sectionalizing switches A and B open.
35 sec	OCB's 787 and 790 close; OCB 787 trips.
45 sec	Sectionalizing switch B closes.
55 sec	Sectionalizing switch A locks out.
65 sec	OCB 787 closes, trips, locks out.

Permanent Fault S

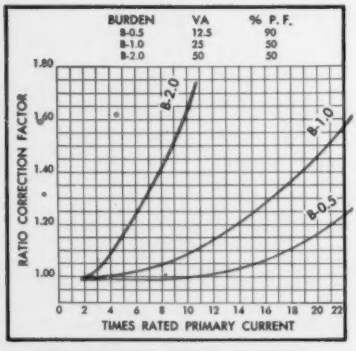
Time	Operation
0 sec	Fault occurs; OCB's 787 and 790 trip.
5 sec	OCB's 787 and 790 close, trip.
15 sec	Sectionalizing switches A and B open.
35 sec	OCB's 787 and 790 close, OCB 790 trips.
45 sec	Sectionalizing switch A closes.
55 sec	Sectionalizing switch B locks out.
65 sec	OCB 790 closes, trips, locks out.

(NOTE: Fault S may be on either line as shown above.)

Fig. 1—Details of automatic sectionalizing scheme. Coordination of VR switches and OCB's is tabulated.

NEW 5-Kv Molded CURRENT TRANSFORMER

...for Indicating and Tripping Service



Typical 60-cycle overcurrent curves for Type LRM current transformer.

Extends Line of Maintenance-free Epoxy-resin Units

Latest in a growing family of molded units, this Type LRM current transformer rated 5 kv is already a prime favorite with panel and switchgear designers. Molded of epoxy resin, this new transformer is virtually maintenance-free. It has high impact strength . . . resists mechanical forces, moisture and fire. These advantages at no extra cost.

All units are supplied with a short-circuiting strap, removable after installation. Base design permits mounting anywhere—on walls, bars, channels, etc.

Allis-Chalmers instrument transformers are available in the widest possible rating range. Many are molded units. Other epoxy-resin designs are in pilot production. For complete information, see your A-C representative, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5503

ortho-88

Patent Pending

ALSO AVAILABLE IN COMMERCIAL DESIGN

ABSOLUTELY NOTHING LIKE IT FOR FAST INSTALLATION AND FLEXIBILITY

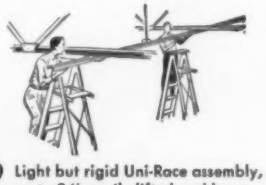
Snap—and It's Up. The inset shows how the plug built into the fixture automatically engages a receptacle in the Uni-Race. Simple hooks and latches fasten the fixture to the Uni-Race.

Contractors throughout the country report that a complete Gibson Ortho installation takes, on the average, only 22 man-minutes per fixture, including stems, lamping and mounting. That's just a fraction of the time required for conventional installations. But speedy installation is only part of the story. Consider the flexibility the owner enjoys. Ortho fixtures can be mounted in continuous rows or at intervals, and re-spaced at any time in a matter of minutes.

WRITE, WIRE OR CALL FOR COMPLETE INFORMATION

3 SIMPLE STEPS TO INSTALL THE ORTHO

1 Telescoping sections of Uni-Race assembled and wired on the floor.



2 Light but rigid Uni-Race assembly, up to 24', easily lifted and hung.

3 Fixtures snap into place in seconds without tools. No wired connection.

Patent Pending

Gibson LIGHTING

GIBSON

MAKERS OF THE NEW Ceilo•35 WORLD'S THINNEST FIXTURE WITH NO DARK AREAS

IN CANADA manufactured under franchise by one of Canada's oldest and largest manufacturers of lighting fixtures ELECTROLIER MFG. CO. Ltd., Montreal

Television control of utility substations

Engineer H. L. Cowart points to the switchboard to be televised.

Probably the first utility to investigate use of television for substation control purposes, the Georgia Power Company, with the Raytheon Corporation, has successfully conducted pioneer tests involving switchboard picture transmission by microwave.

By R. E. Rutherford
Georgia Power Company
Atlanta, Ga.

◆ USE OF INDUSTRIAL television as a means of remote control for automatic substations and hydroelectric plants is being studied by the Georgia Power Company.

The firm recently inaugurated its pioneer study in this field by conducting a series of tests at its Boulevard substation in Atlanta. The tests were made in cooperation with local representatives of the Raytheon Corp. A picture of the switchboard in the control room was transmitted by microwave to the load dispatcher's building, a distance of approximately 200 yards, and there received on the screen of a television set.

Edgar S. Harrison, Georgia Power chief mechanical engineer, above left, and Earl J. Archbold, the company's chief electrical engineer, inspect the camera that photographs image for television transmission.

Agreeable concensus

Representatives of the company's engineering and operating departments and of its Atlanta division conducted and witnessed the tests. H. H. Strozier, assistant chief planning engineer, reported the group's concensus was that television affords an excellent means of reading switchboard instruments by an operator at a remote station.

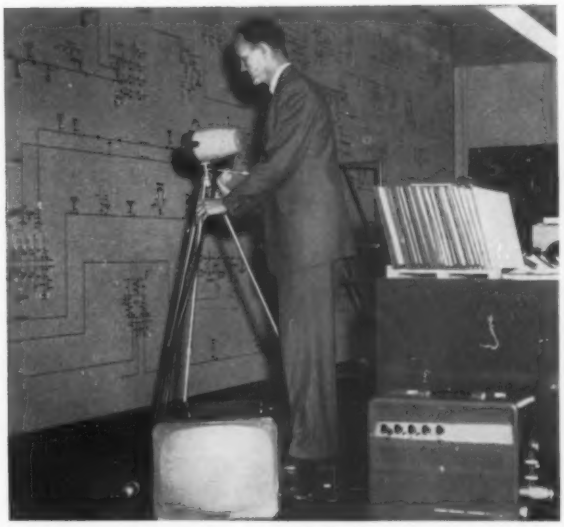
Although these tests were conducted over a distance of only 200 yards, Raytheon officials said, the microwave channel will operate with the same efficiency over line of sight distances up to 30 miles.

In view of this operating efficiency, the company also is studying the feasibility of television in a remote control system in some of its hydroelectric plants. Raytheon officials described how a receiver could be set up at a central hydro station and two cameras be placed at each of the hydro stations in the immediate area. One of the cameras would transmit views of the operating panels and the other, to be mounted outside the plant, would provide a full view of the plant itself and of the adjacent dam site and plant grounds.

Similarly, cameras at outlying substations could be used to pick up switchboard panels, and the images relayed to an operator at a central substation.

The company already at several

Engineer Cowart adjusts the microwave transmitter.



He next prepares camera for the final closeup shot.

Receiving set brings in image of televised switchboard panel, clearly enough for meters to be read.

substations in the Atlanta and Augusta areas is operating remotely by supervisory control. Under this remote control system, information on the instruments in the substation control house is made available to a remote operator at a central point.

Remote operation at circuit breaks and other equipment can be accomplished by remote operator. This now is done by telemetering, which transmits the information in pulses over telephone wires. Although this system is a vast improvement over the older method of assigning men to non-central substations or hydro plants or relying on frequent visits to these stations and plants by a central station employe, it was felt that the use of television would be an even greater improvement. Through the use of a television system, the operator is afforded an actual picture of the instruments.

In the proposed television system, a microwave channel is used as the connecting link between the transmitter and receiver.

Closed circuit television now is being used in many industrial

Continued on page 106)

The Fifty Largest Utilities as listed in the 1957 FORTUNE DIRECTORY
★ American Tel. & Tel. (New York)
★ Pacific Gas & Electric (San Francisco)
★ Consolidated Edison of New York
★ Commonwealth Edison (Chicago)
★ American Gas & Electric (New York)
★ Tennessee Gas Transmission (Houston)
★ Public Service Elec. & Gas (Newark, N. J.)
★ Southern California Edison (Los Angeles)
★ Southern Co. (New York)
★ Detroit Edison (Detroit)
★ Philadelphia Electric (Philadelphia)
★ Niagara Mohawk Power (Syracuse, N. Y.)
★ General Telephone (New York)
★ El Paso Natural Gas (El Paso, Texas)
★ Columbia Gas System (New York)
★ General Public Utilities (New York)
★ Consumers Power (Jackson, Mich.)
★ American & Foreign Power (New York)
★ American Natural Gas (New York)
★ United Gas (Shreveport, La.)
★ Texas Utilities (Dallas)
★ Middle South Utilities (New York)
★ Pacific Lighting (San Francisco)
★ Texas Eastern Transm. (Shreveport, La.)
★ Consolidated Natural Gas (New York)
★ Central & South West (Wilmington, Del.)
★ New England Electric System (Boston)
★ Pennsylvania Power & Light (Allentown)
★ Union Electric (St. Louis)
★ Ohio Edison (Akron)
★ Virginia Electric & Power (Richmond)
★ Peoples Gas Light & Coke (Chicago)
★ Northern States Power (Minneapolis)
★ Cleveland Electric Illum. (Cleveland)
★ West Penn Electric (New York)
★ Duke Power (Charlotte, N. C.)
★ Long Island Lighting (Mineola, N.Y.)
★ Baltimore Gas & Electric (Baltimore)
★ Duquesne Light (Pittsburgh)
★ Northern Natural Gas (Omaha, Neb.)
★ Wisconsin Electric Power (Milwaukee)
★ Transcontinental Gas Pipe Line (Houston)
★ Pennsylvania Eastern Pipe Line (New York)
★ Public Service of Indiana (Plainfield)
★ Florida Power & Light (Miami)
★ Illinois Power (Decatur, Ill.)
★ Western Union Telegraph (New York)
★ [illegible] (Boston)
★ New York State Electric & Gas [illegible]
★ [illegible] Cincinnati
© 1957 Time Inc.
Among the 50 largest utilities, only one electric or telephone utility is a Preformed prospect...
the rest are Preformed customers
In July, 1947, Preformed Line Products Company didn't have a customer; all the electric and telephone utilities were prospects. Today, the situation is almost completely reversed.
For example, in FORTUNE's list of the "Fifty Largest" utilities, only one of the *electric* and *telephone* utilities mentioned is still a prospect; all the rest are now Preformed customers. In other words, the Preformed principle of using preformed helical rods for line accessories has gained almost complete acceptance in only 10 years.
If you are among the few utilities not utilizing Preformed, you might ask "Why?". PREFORMED LINE PRODUCTS COMPANY, 5349 St. Clair Avenue, Cleveland 3, Ohio. Cable Address: Preformed-Cleveland ...in 10 years the leading manufacturer of armor rods, dead-ends, Guy-Grip dead-ends, splices and other line accessories.
PLP
You can look up to Preformed

ROBERT S. STEVENSON

Portrait by Fabian Bachrach

"At Allis-Chalmers we believe that we can do our fellow-employees no greater favor than to recommend that they invest in a 'nest-egg' fund of U.S. Savings Bonds.

"While this program has been going on for many years—made easy through the Payroll Savings Plan—we recently offered all Allis-Chalmers people a chance to review their individual bond purchasing schedules and to bring them up to date.

"As a result, more than 52% of the total Allis-Chalmers organization of about 40,000 people are buying U.S. Savings Bonds at a rate of approximately $6,000,000 a year."

ROBERT S. STEVENSON, *President*
Allis-Chalmers Manufacturing Company

Start your employees on the path of future financial security through automatic savings in the new and improved Series E Savings Bonds. It's simplicity itself. Just contact your State Director, U.S. Savings Bonds Division. He'll provide all the material and assistance you need to install a Payroll Savings Plan or build enrollment in one already existing. Look him up in the phone book or write for full information to the U.S. Savings Bonds Division, Treasury Department, Washington, D.C.

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ELECTRICAL SOUTH

TODAY—PAYROLL SAVINGS ENROLLMENT IS AT A NEW PEACETIME PEAK!

Notes on new utility equipment

Power factor correction unit installed at service entrance

A PRE-ASSEMBLED secondary power factor correction unit which can be installed easily at the service entrance without wiring changes has been announced by the Sagamo Electric Co., of Springfield, Ill.

The "Secovar," as it has been trade-named, combines a power capacitor with a socket-meter mounting adapter in one metal enclosure. A fuse in each lead provides protection in event of either line or ground faults.

The unit releases distribution transformer and secondary-circuit capacity. Secondary I^2R losses are reduced and voltage level at customer's service entrance is improved. Additional benefit is derived with same kilovar primary capacitors.

The Secovar is available in 1.5 and 2 kvar sizes. Also available in 1 kvar size is a type for use with standard meter and transformer enclosures.

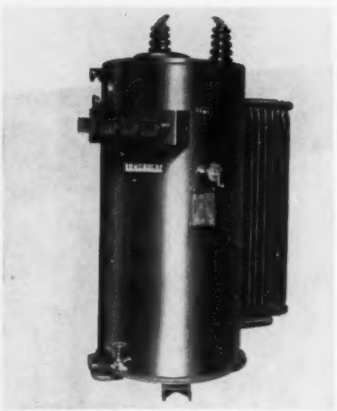
For additional data, ask for item U-1201, using the coupon on page 105.

Substation transformers feature new winding design

A NEW LINE of substation transformers (Type LD) is available from Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa. Ratings are through 15 kv, 250 to 500 kva, single phase.

The transformer line features a new Lowgrocap® winding design which distributes surge voltages more evenly, affording added resistance to voltage breakdown. This feature, plus the new "D" core design, provides a smaller and lighter transformer with maximum utilization of tank space.

Weight reduction is up to 25 per cent. The new round tank with flat fin coolers on one side away from the low-voltage terminals reduces installation area about 35 per cent.



Bushing mounting is simplified, eliminating a considerable amount of external hardware. The core and coil assembly is rigidly fastened to the base, which incorporates jacking pads. The tank is sealed by welding around the bottom, making it possible to untank the unit for inspection without disturbing core or coils.

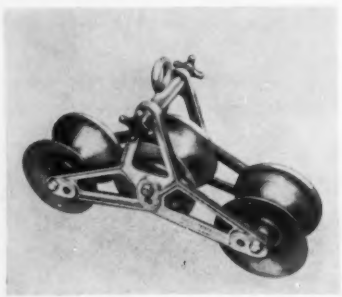
For additional data, ask for item U-1202, using the coupon on page 105.

Triple pulley simplifies cable installation

A TRIPLE PULLEY cable guide designed to simplify the installation of cables in a ladder system or cable trough has been announced by the T. J. Cope Division of Rome Cable Corp., Collegeville, Pa. The cable pulling rigging is available for rent as well as for sale.

Three aluminum sheaves are mounted in an aluminum frame that can be secured to a structural support, and so simplify the pulling of cables around horizontal or vertical bends.

The pulleys are adjustable to different radii, thus permitting a single device to be suitable for virtually any turn desired. The cables, thus, can be laid in over the frame rather than having to be pulled through. The new cable pulling device will help to reduce further the time needed to install cables in a trough or ladder system. Cope supplies galvanized steel cable trough that is widely used in industry and utilities for the support of flexible cables.



For additional data, ask for item U-1203, using the coupon on page 105.

Service entrance sleeves have variable hole depth

MANY NEW FEATURES have been incorporated in the service entrance sleeve redesigned by the Jasper Blackburn Corp., 1525 Woodson Rd., St. Louis 14, Mo.

The permanent color coding is *printed* (not indented) and makes it easier for linemen to read. assuring quick, positive size identification.

Ends of the sleeve are sealed with aluminum sensitized tape. The tape is easy to puncture and, if a particle of the seal is pushed into the chamber, it is conductive.

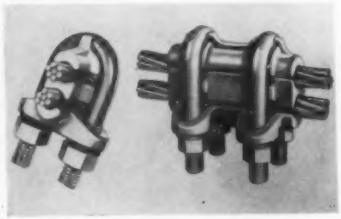
Hole depth increases with size of conductor, providing greater contact area where needed, to assure greater conductivity.

In addition, each sleeve contains a *measured amount* of inhibitor, which won't squirt out on glove or face. Blackburn sleeves are available in a complete range of sizes in both ½" and ⅝" diameter.

For additional data, ask for item U-1204, using the coupon on page 105.

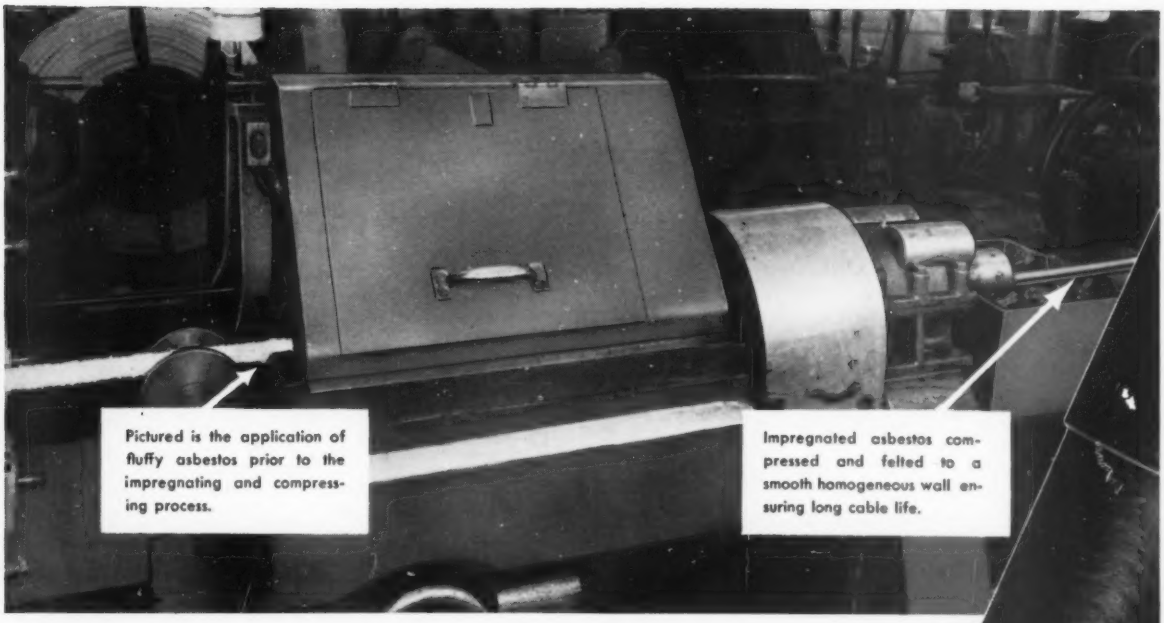
New U-bolt connectors for transmission, distribution

THE A. B. CHANCE Company, 210 North Allen St., of Centralia, Missouri introduces a new line of U-bolt connectors. Made for general-transmission and heavy-distribution connections, taps, and loops, they are



available in a 1-bolt type (with either aluminum or steel hardware) and a 2-bolt type (with aluminum hardware, only).

Cast of high-strength, heat-treated aluminum alloy, these connectors are


Pictured is the application of fluffy asbestos prior to the impregnating and compressing process.
Impregnated asbestos compressed and felted to a smooth homogeneous wall ensuring long cable life.

It's the
ROCKBESTOS
ASBESTOS VARNISHED CAMBRIC
COMBINATION
Beneath the Braid that Assures Long Cable Life

Seamless Felted Asbestos Walls

+ Impregnation with selected compounds

+ Quality Varnished Cambric Tapes

N.E.C. Type AVA Wire and Cable may look alike on the surface. But a look under the braid will quickly show why the Rockbestos A.V.C. gives longer lasting service.

First, two dense, uniformly impregnated felted asbestos walls seal the varnished cambric tapes. They keep the dielectric strength high . . . give added strength against damage and flexing.

Second, the varnished cambric tapes are made to *our own exacting specifications* which incorporate standards beyond those called for by industry.

Add to this, thirty years of know-how in the application of asbestos and VC Tapes to Rockbestos A.V.C. and you get wires and cables that eliminate costly rewiring jobs and expensive maintenance . . . assure long cable life.

Write for the new booklet "Specification RSS 88" which gives complete construction and test specifications.

ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • CHICAGO • PITTSBURGH • LOS ANGELES • DETROIT
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STOCKED COAST TO COAST
Standard Rockbestos A.V.C. construction (N.E.C. types AVA, AVB, etc.) are available for immediate shipment. Call or write nearest branch office.

designed for making aluminum-to-aluminum connections. They are "bright dipped" and coated with compound to assure clean, protected connections.

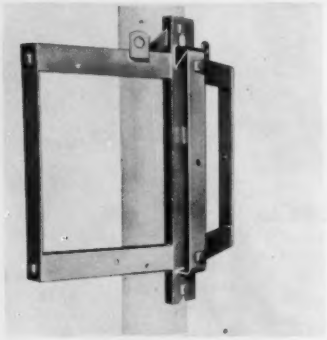
Conductor grooves are contoured to trap all outside conductor strands to prevent "bird caging" under surge conditions. Contact surfaces provide a tight, low-resistance connection.

For additional data, ask for item U-1205, using the coupon on page 105.

Cluster-mounting brackets available in three sizes

TRANSFORMER cluster - mounting brackets, designed to facilitate the banking of single-phase transformers rated 3 kva through 167 kva, are being manufactured by Line Material Industries, 700 W. Michigan St., Milwaukee 1, Wis.

These one-piece V-shaped brackets are available in three sizes to accommodate transformer combinations up to and including three 25-kva, three 50-kva, and three 167-kva transformers.



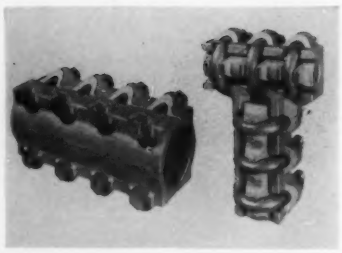
Sturdy integral construction facilitates installation with through bolts, affording economies in time and labor. The design provides maximum climbing and working space—approximately 120° of the pole circumference. Strong lifting eyes are adequate to raise units complete with three transformers.

Standard EEI-NEMA transformer mounting hole spacings are employed. Provisions for jumper pins and ground clamps are also incorporated. EEI-NEMA electrical and physical clearance requirements are satisfied, including those for sidewall-mounted bushing transformers. Brackets are hot-dip galvanized after fabrication.

For additional data, ask for item U-1206, using the coupon on page 105.

Power connectors offer high electrical conductivity

A COMPLETE LINE of aluminum power connectors for tubing to tubing, cable to cable, tubing to cable or terminal lug connections, etc., has been introduced by the Delta-Star



Electric Division of the H. K. Porter Co., Inc., 2437 Fulton St., Chicago 12, Ill.

This line of connectors is designed for easy installation, high electrical conductivity, and positive mechanical connection thus insuring continuous efficient service over a long period of time.

Some of the features stated for these new connectors are: strong positive gripping action; positive wrapping action assures a low resistance joint not subject to loosening due to vibration or strain; designed to carry full rated current of the conductors with temperature rise of connector not exceeding that of conductor; edges and ends of connectors are rounded to eliminate abrasion; recessed bolt heads for single-wrench assembly and disassembly; meet NEMA standards in every respect.

For additional data, ask for item U-1207, using the coupon on page 105.

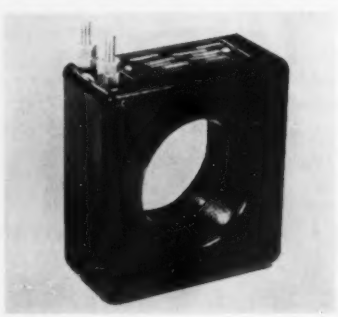
Molded current transformers for indoor and outdoor use

A NEW LINE of molded indoor or outdoor current transformers using epoxy resins for switchboard or cabinet mounting has been introduced by the Standard Transformer Co., of Warren, Ohio.

The manufacturer recommends them for use with ammeters and wattmeters on industrial applications. The units, designated CGM, are designed for use in limited space.

According to the manufacturer, type CGM is available in ratings from 100 through 800 primary; 5 ampere secondary; 25/400 cycles. Impulse level is 10 kv. Insulation class is 600 volts.

The cable carrying the load current is passed through the opening in the transformer and constitutes the primary winding. The transformer is inserted on the load cable. Leads are carried from the terminals of the winding to the ammeter to be operated. A multiple number of ratios can be obtained by addition of turns in the window and addition or subtraction of turns in the secondary.

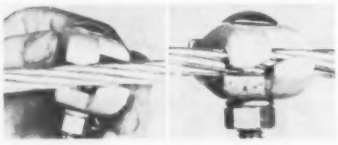


For additional data, ask for item U-1208, using the coupon on page 105.

Aluminum parallel clamp facilitates installation

WITH JUST a twist of the wrist, the PCA aluminum parallel clamp developed by the Penn-Union Electric Corp., 315 State St., Erie, Pa., is hooked onto the run.

It takes only a few turns of the bolt to open the clamp enough to slip over its maximum conductor. Cast from high strength aluminum alloy, especially treated at the factory to prevent aluminum oxide from reforming, giving a low-resistance path



from run to tap. Filled with "Cual-Aid" contact compound and packed in individual polyethylene bags.

Galvanized steel bolt, nut and lockwasher—also available with hex head bolt if desired. The fingers completely enclose the aluminum or copper conductor from 1/0 ACSR maximum to #6 Str. minimum, over the fitting's entire range—providing high wrap-around and resistance to creep. Sample is obtainable, filled with "Cual-Aid" contact compound and packaged in individual polyethylene bag.

For additional data, ask for item U-1209, using the coupon on page 105.

Automatic switching control for street lighting circuits

AN ELECTRO-MECHANICAL control for automatic switching of street lighting circuits has been announced by Tuttle and Bailey, division of Allied Thermal Corp., New Britain, Conn.

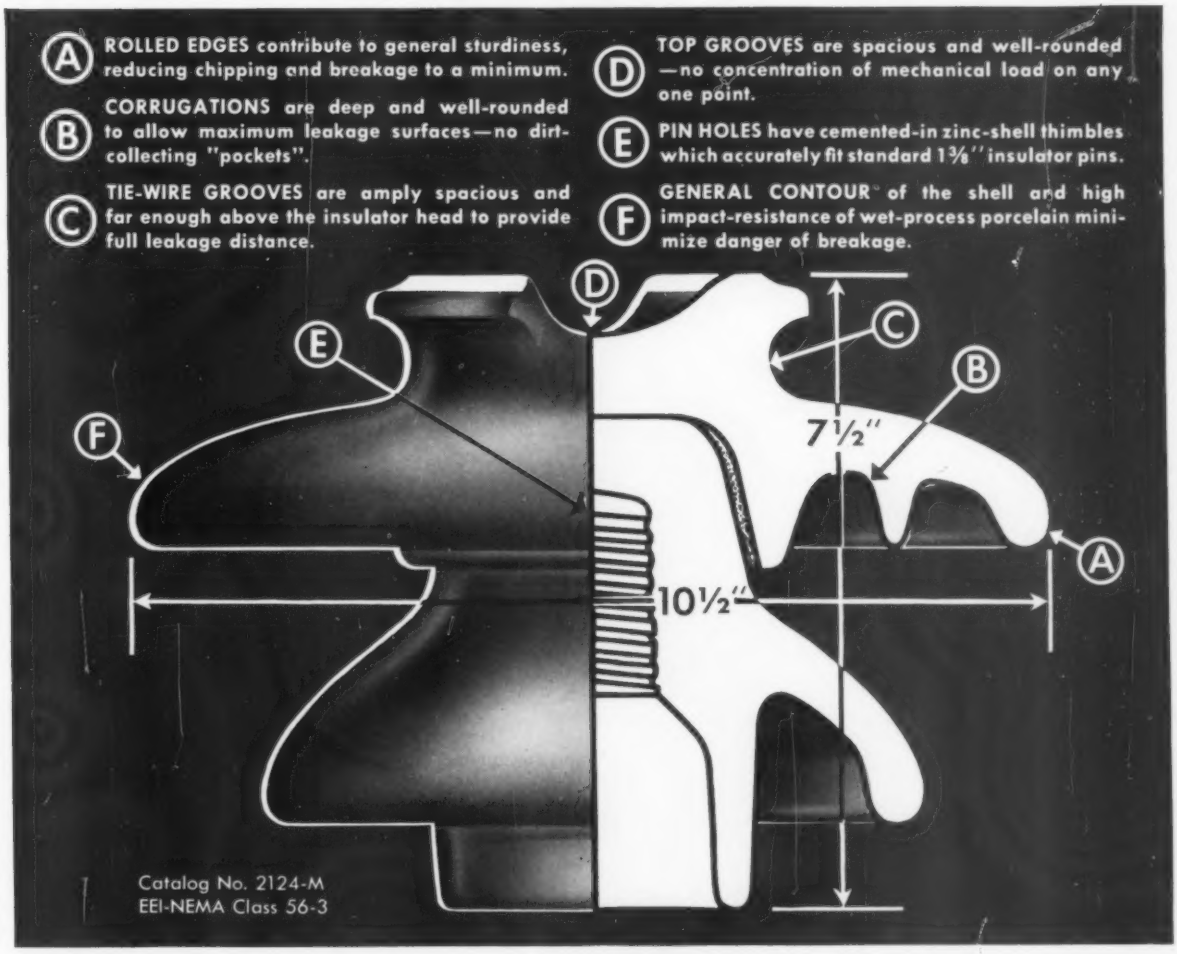
The control, designated the Synchro Switch, does not utilize tubes, transistors, or a magnetic load relay in its circuit. By eliminating these components, the Synchro Switch also eliminates heating and "drift" problems, caused by amplification losses and tube aging.

Tubes and transistors are replaced in the new Synchro Switch by a cadmium selenide photocell which senses any change in surrounding light conditions.

The unit also incorporates a synchronous motor and a high-capacity,

Thomas high-voltage pin-type insulators—quality-built for top performance

CHECK THESE FEATURES


A ROLLED EDGES contribute to general sturdiness, reducing chipping and breakage to a minimum.
B CORRUGATIONS are deep and well-rounded to allow maximum leakage surfaces—no dirt-collecting "pockets".
C TIE-WIRE GROOVES are amply spacious and far enough above the insulator head to provide full leakage distance.
D TOP GROOVES are spacious and well-rounded —no concentration of mechanical load on any one point.
E PIN HOLES have cemented-in zinc-shell thimbles which accurately fit standard 1⅜" insulator pins.
F GENERAL CONTOUR of the shell and high impact-resistance of wet-process porcelain minimize danger of breakage.
7½"
10½"
Catalog No. 2124-M
EEI-NEMA Class 56-3

Shown here is one of the Class 56 of EEI-NEMA high-voltage pin-type insulators made by Thomas Works.

Especially recommended for transmission applications, these insulators embody all the tested and proven refinements of design and construction that assure long service life and superior performance under severest operating conditions.

An added feature: All five Thomas EEI-NEMA High-Voltage Pin-Type Insulators are also available with Thomas "QT" (Quiet-Type) radio treatment at no extra cost.

Physical ruggedness and optimum electrical properties are obvious characteristics of Thomas High-Voltage Pin-Type Insulators. For full information, write *Thomas Works, Delta-Star Electric Division, H. K. Porter Company, Inc., Lisbon, Ohio. Offices in principal cities.*

H. K. PORTER COMPANY, INC.

DELTA-STAR ELECTRIC DIVISION

Porter Divisions: Cleveland, Connors Steel, Delta-Star Electric, Henry Disston, Leschen Wire Rope, Quaker Rubber, Refractories, Riverside-Alloy Metal, Vulcan Crucible Steel, W-S Fittings, H. K. Porter Company (Canada) Ltd.

snap-action switch which turns the street light on or off, depending on light conditions. The system is protected against transient light, such as lightning and automobile lights, by an integral time delay.

The control has a range of adjustment from .5 to 8 footcandles. One of its unique features is that both the turn-on and turn-off points can be easily and accurately adjusted. Load rating of the control is 1200 watts at 120 or 240 volts. Units are also available for 25-cycle operation.

The control is totally enclosed in a plug-in type casing which is interchangeable with existing mountings. A pole- or cross-arm-mounting is also available.

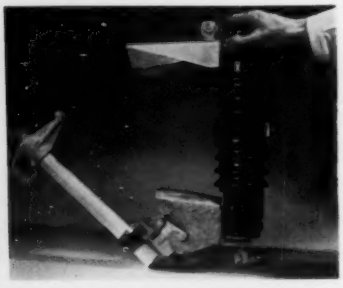
For additional data, ask for item U-1210, using the coupon on page 105.

Loadbreak cutout designed for extra heavy-duty

AN EXTRA HEAVY-DUTY loadbreak cutout (Type DX) is available from the Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

The cutout is available in ratings of 5.2 and 7.8 kv, with fault interruption capacity of 10,000 amperes. At a 15-kv rating, the interrupting capacity is 8000 amperes.

The fuse tube of the new cutout is heavier and is made of stronger



Micarta® than the previous lower rated models. The new fuse tube is interchangeable in the same fuse holder mounting with the standard and heavy-duty models of the same rating.

The cutout also has a double-vented feature, containing an expendable cap at the top, which melts when pressures inside are too high to escape through the regular aperture. A new eyebolt terminal is used.

Operation is identical to the other model DX cutouts. As in the previous models, the new cutout is available with a loadbreak fuse holder if desired.

For additional data, ask for item U-1211, using the coupon on page 105.

Socket-mounted time control for auto-switch capacitors

A SOCKET-MOUNTED time switch control for auto-switch capacitor equipment has been introduced by the General Electric Co., Schenectady 5, N. Y.

The new device, designed to control FKC or VR oil switches and vacuum switches used with pole-top and substation capacitor equipment, was de-

veloped to meet the utility industry's growing preference for this type of control.

Similar to GE's Type TGW-7 off-peak control for water heaters, the new control is simple in design and operation. It includes a sealable opening for time-setting purposes, and a "push-pull" omitting device to omit switching on designated days of the week.

Two sets of trippers provide two "on-off" operations per day, and are standard equipment with the new unit. Extra trippers and a control for operating at 240 volts can be furnished upon request.

The timing and driving mechanism of the new control is a high torque motor with permanent lubrication. The contact assembly of the unit is rated 35 amperes, a-c, and features "quick-make" and "quick-break" action. All control swith connections are brazed to give circuit continuity.

For additional data, ask for item U-1212, using the coupon on page 105.

Network protector relay test set

A NEW INSTRUMENT has been added to the line of relay test equipment offered by the Multi-Amp Corp., 465 Lehigh Ave., Union, New Jersey.

New test sets have been developed for on-location or shop testing of underground network system protectors and relays. One box encloses the relay test set and one the mechanism test set.

Either box, weighing less than 10 pounds can be readily taken into manholes for checking the operation of the various components of the protector, such as the contactor, breaker closing and tripping, current transformers and the master and phasing relays.

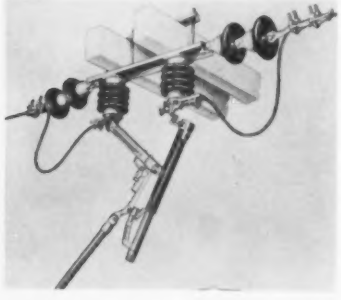
The instruments are designed to facilitate testing with a minimum of set-up time and equipment.

For additional data, ask for item U-1213, using the coupon on page 105.

Tool operated disconnect for distribution field

A DISTRIBUTION DEVICE known as the tool operated disconnect has been announced by the S & C Electric Co., 4435 Ravenswood Ave., Chicago 40, Ill. The new device is made for use with the Loadbuster, the portable loadbreak tool, and as such it is also a low cost load-switching device.

The new disconnect is rated at 15 kv, 400 amperes, it has an impulse withstand rating of 95 kv (or 110 kv



for heavier types) and a momentary short time current rating of 20,000 amperes. These ratings put the new disconnect in the station-type disconnect class, yet it is priced in the same range as distribution disconnects.

The tool operated disconnect provides low cost load switching anywhere on the distribution system since it is designed for use with Loadbuster.

The new tool operated disconnect has a number of design features not normally found on conventional distribution disconnects: heavy duty channel base resists distortion; large bearing surface of base prevents cross-arm damage; four-bolt mounting with two back-up members for double crossarm mounting; dead-ending provision requires no extension links to give adequate electrical clearance; two-stud insulator prevents shifting or turning of live parts; substantial leakage distance (13¾" on 95 kv BIL); 10½" disconnect gap; silver-to-silver contacts; dual-purpose connectors take aluminum or copper.

For additional data, ask for item U-1214, using the coupon on page 105.

HUBBARD AND COMPANY

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Know the law

by Arthur L. H. Street

Liability for injuries to third persons

THE PROBLEM: An oil company owned filling station premises and leased them to an operator. In a grease pit was an electrical outlet for use in connecting a pump to expel waste oil, gasoline, and water from the pit. Due to defective construction of the electrical outlet a spark ignited gasoline fumes and an employee of the operator of the station was injured. He sued the oil company and the operator for damages. (The electrician who installed the outlet was not joined as defendant. But as will be seen from discussion that follows mention of this case, it is possible that had he been joined as a defendant, he might have been adjudged liable.) Was the suit improperly dismissed?

COURT'S ANSWER: Yes. (Cooper v. Graham, 98 S. E. 2d 843, decided by the South Carolina Supreme Court.)

The court ordered a new trial, on the ground that it was for a jury to say whether or not the oil company or the operator of the station, or both, were negligent in permitting an unsafe condition to exist in the grease pit.

Of special interest to electrical contractors are two paragraphs of the Supreme Court's opinion, which, summarized, are to this effect:

One electrical contractor testified that the electrical outlet was an open socket and that the "plug-in" was open for the connection, and when it was plugged in it would cause the gasoline fumes to ignite because there would be a spark when the pump motor was on starting point. He testified that there was nothing to protect the sparks from the electrical receptacle because it was wide open. When he went to the filling station after the accident he found the oil company's electrician checking the pump.

Another contractor, experienced in wiring grease pits testified that electricians have a certain code which they follow in wiring "hazardous situations." He described a grease pit as coming within this definition because of the highly combustible fluids used. He testified that electrical outlets in a grease pit should be in explosion proof enclosures; and that the particular outlet was not a proper appliance, because when it was plugged in an arc was created which would ignite gasoline fumes. He further testified that an open outlet should never be used in a grease pit.

Contractor's liability

Most, if not all, courts would probably agree with what the Arkansas Supreme Court said in the case of Canal Construction Co. v. Clem, 260 S. W. 442:

"The general rule is well established that an independent contractor is not liable for injuries to a third person occurring after the contractor has completed the work and turned it over to the owner, and the same has been accepted by him, though the injury resulted from the contractor's failure to properly carry out his contract."

But it seems that that general rule has important exceptions. The rule may apply to an electrical contractor who follows plans and specifications furnished by the owner, if the contractor has no reason to suppose that any danger lurks in the plans and specifications. But the electrical contractor is in a "tighter spot" if he or his engineer prepared the defective documents.

What the New York Court of Appeals said in a case before it probably reflects what most courts would regard as being sound law. The case involved a building contractor's liability for structural defects resulting in injury to a third person, but obviously the same should apply to the responsibility of an electrical contractor:

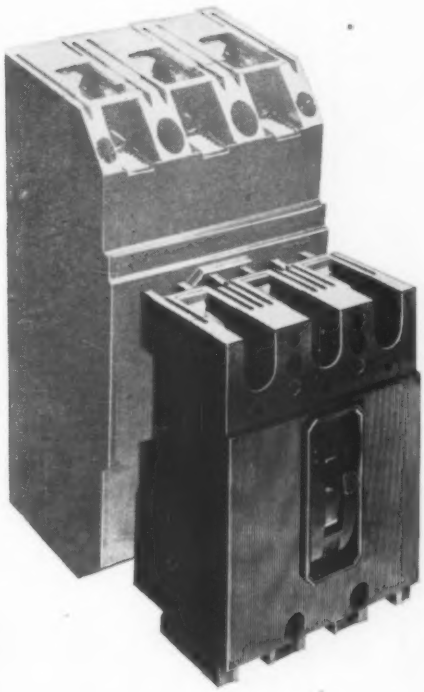
"There was nothing to show that the plans and specifications were so obviously defective that a contractor of average skill and ordinary prudence would not have attempted the construction according to the plans . . . A builder or contractor is justified in relying upon the plans and specifications which he has contracted to follow, unless they are so apparently defective that an ordinary builder of ordinary prudence would be put on notice that the work was dangerous and likely to cause injury." (Ryan v. Feeney & Sheehan Bldg. Co., 145 N. E. 321.)

In a New Jersey case, the Supreme Court intimated that if a building burned because of negligent installation of electric fixtures for a tenant by a subcontractor, the owner of the building would have had a valid damage claim against the subcontractor. (Schutte v. United Electric Co., 53 Atl. 204.)

In a North Carolina case, a third person was injured through negligent repair of an electric light fixture which fell upon him. The Supreme Court referred to the general rule that negligent performance of a contractor does not create liability to a third person. But this rule is subject to the qualification that a suit for damages may be maintained by a stranger to the contract for the execution of a particular piece of work if the product is imminently dangerous to third persons or the public." (Williams v. Charles Stores Co., 184 S. E. 496.)

In a Connecticut case, Bogoratt v. Pratt & Whitney Aircraft Co., 157 Atl. 860, the Supreme Court of Errors decided: Where an electrical contractor installed wires in an uncompleted building and passed them through a window 16 feet above the ground, but it was up to someone else to energize the wires by attaching them to poles, the electrical contractor was not liable for injury to a painter who touched the wire after it had been energized and after the electrical contractor had turned the work over to the owner. The contractor was not negligent in failing to post a warning sign.

NEW!



I-T-E ANNOUNCES NEW 100 amp 480 V "EH" FRAME CIRCUIT BREAKER

Reduces mounting space requirement by 40%

Recognizing industry requirements for an intermediate, compact 100 amp frame 480 v breaker, I-T-E engineers have designed a new "EH" frame molded case circuit breaker which requires 40% less mounting space than breakers previously employed to meet the rating capacity.

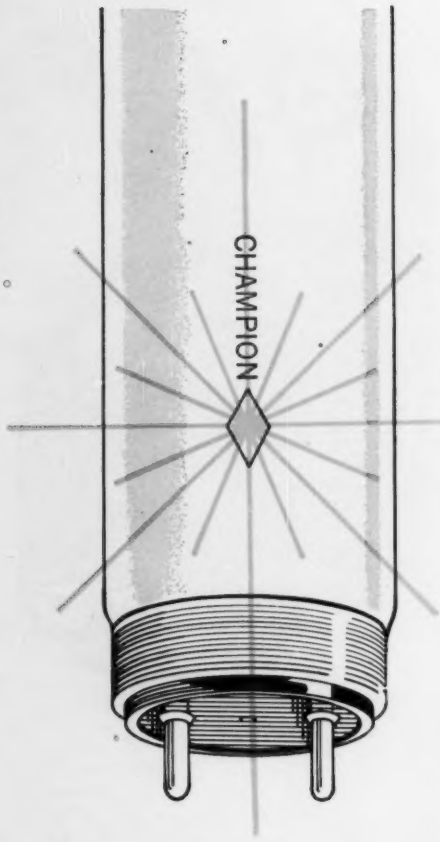
The new "EH" frame breaker is ideal where intermediate voltage and interrupting ratings must be handled, and space is at a premium. Specify the I-T-E "EH" frame and benefit from the compact design advantages which this new circuit breaker provides.

Contact your local I-T-E sales office or write I-T-E Circuit Breaker Company.

SMALL AIR CIRCUIT BREAKER DIVISION

I-T-E CIRCUIT BREAKER COMPANY

19TH AND HAMILTON STREETS, PHILADELPHIA 30, PENNSYLVANIA



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MILLIONS OF LAMPS A YEAR . . .
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SOUTHERN BREAKFAST

To be held in conjunction with the SEWA Industry Day Meeting and sponsored by the Southeastern Electrical Manufacturers' Representatives Club.

Our speaker will be Leo P. Aikman, *Atlanta Constitution* columnist—he's hilarious and will have you rolling in the aisles.

Menu:
Fruit Juice
Southern Country Ham and Eggs
Grits
Grits
Hot Biscuits
Coffee

Guests will be the SEWA members and their wives, so make your plans to attend.

Write for reservation.

Southeastern Electrical Manufacturers Representatives Club of Atlanta
806 Peachtree St., N. E.
Atlanta 8, Ga.

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SOUTHEASTERN ELECTRICAL WHOLESALERS ASSOCIATION, INC.

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All Branches of the Electrical Industry
Are Invited to Come South

For SEWA'S Eighth "Industry Day" Meeting At
The Biltmore Hotel, Atlanta, Ga.

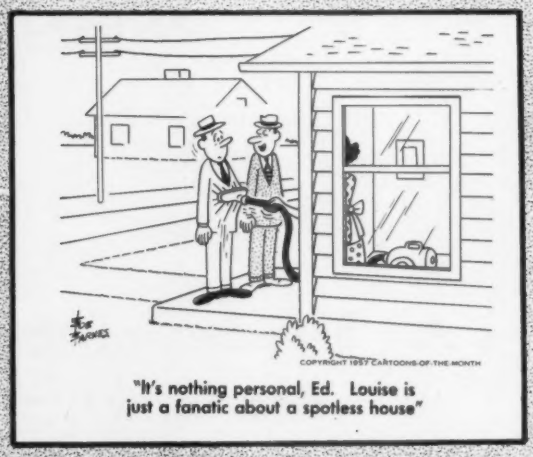
"Where All May Find a Common Meeting Ground and Sounding-Board"

Meet Your Friends and Competitors
January 29 - 30 - 31, 1958

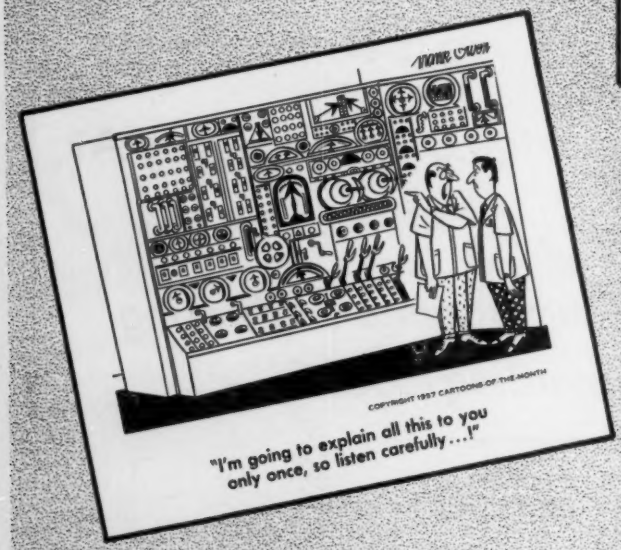
Your Work Can Wait!

"Just one year I wish he'd place our Christmas bonus on our desk and let it go at that!"

"Lend me ten dollars, hon - I'll return it the instant I get your pay envelope!"



"It's nothing personal, Ed. Louise is just a fanatic about a spotless house"



"I'm going to explain all this to you only once, so listen carefully...!"

"Why can't you invite people who like the same programs we do?"

YOU SAVE with National Electric Wire & Cable on NON-RETURNABLE REELS

HERE'S WHY... NO REEL INVESTMENT • NO BOOKKEEPING • NO RETURN SHIPPING • LESS HANDLING • LIGHTER WEIGHT

National Electric provides non-returnable reels for all sizes up to 30 inch diameter.

National Electric Products

PITTSBURGH, PA.

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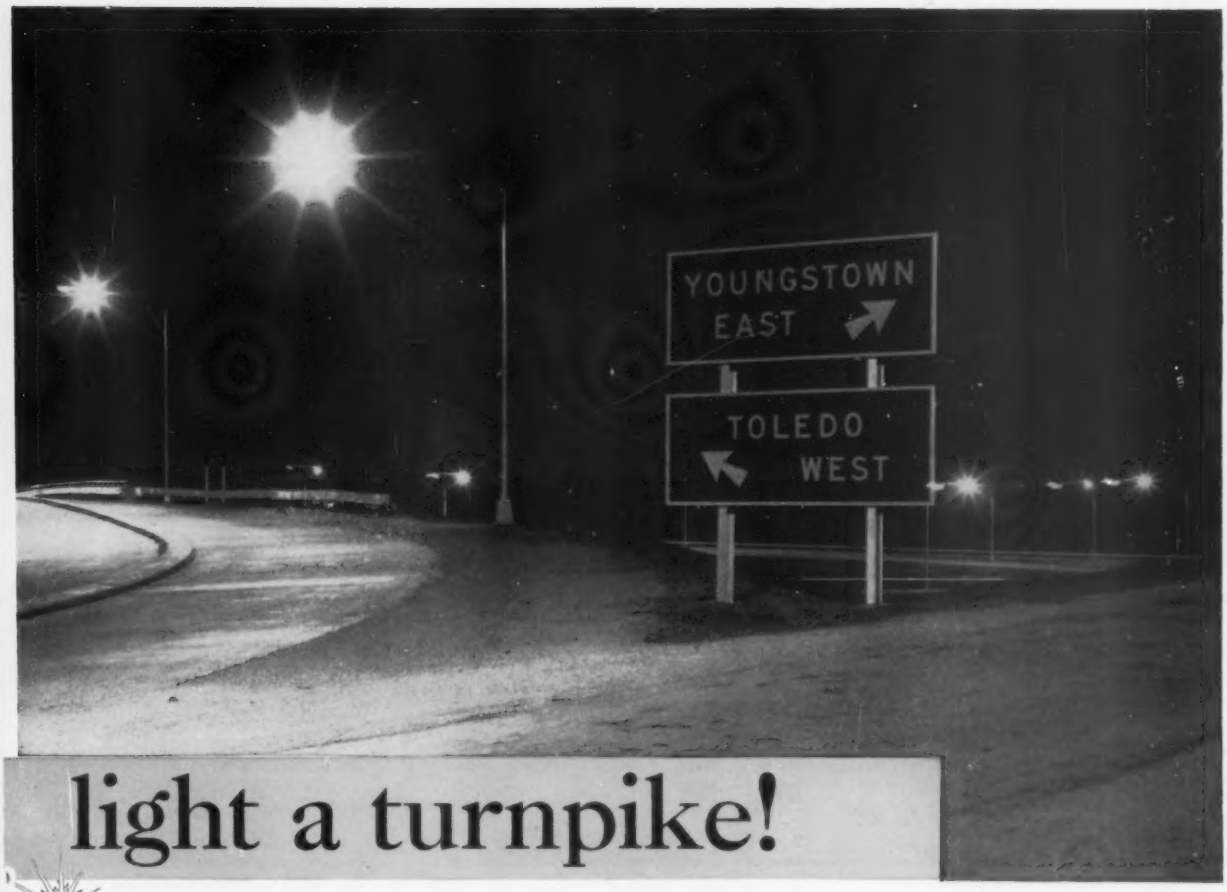
HERE'S the way to



light a turnpike!

The new Ohio Turnpike, spanning the state from Pennsylvania to Indiana, is a model of modern highway construction. And one of the outstanding features of this road is the lighting of the interchanges.

What an immense job it was to build this 241-mile road! Enough dirt was excavated to fill a two-lane tunnel 268 miles long. They dumped enough fill to cover 500 football fields to a depth of 28 feet. Carefully the bogs were drained, slides were stopped and the rock was blasted to make the great road possible.

Skillful engineering is apparent along every foot of the Turnpike—and this includes the selection of vital materials used to build it. Buried in the ground near the interchanges you'll find over half a million feet of Tiger Brand 3,000-volt internal shielded cable serving as main feeders. Many thousands of feet of Tiger Brand RR cable serve as bracket cable in the poles, and an additional quarter million feet of Tiger Brand cable grounds the entire system.

When you install Tiger Brand cable, you have gone a long way toward insuring a trouble-free wiring system.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
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USS TIGER BRAND ELECTRICAL WIRE & CABLE

A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB

- asbestos wire and cable
- mold cured portable cord
- shovel & dredge cable
- paper & lead cable
- varnished cambric cable
- interlocked armor cable
- special purpose wire & cable
- aerial, underground and submarine cable

USS

UNITED STATES STEEL

New, revised estimating tables continued in this issue

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

FIBER CONDUIT BRIDGES 1" - 2 PIPE (ADD AS REQUIRED)

COND. SIZE	HOURS EACH	LABOR COST EACH AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
2"	.11	.138	.165	.193	.22	.248	.275	.303	.33	.358	.385	.413
3"	.11	.138	.165	.193	.22	.248	.275	.303	.33	.358	.385	.413
4"	.16	.20	.24	.28	.32	.36	.40	.44	.48	.52	.56	.60
4 1/2"	.16	.20	.24	.28	.32	.36	.40	.44	.48	.52	.56	.60
5"	.21	.263	.315	.368	.420	.473	.53	.58	.63	.68	.74	.79
		1" SPACING 3 PIPE (ADD AS REQUIRED)										
2"	.11	.138	.165	.193	.22	.248	.275	.303	.33	.358	.385	.413
3"	.16	.20	.24	.28	.32	.36	.40	.44	.48	.52	.56	.60
4"	.16	.20	.24	.28	.32	.36	.40	.44	.48	.52	.56	.60
4 1/2"	.21	.263	.315	.368	.420	.473	.53	.58	.63	.68	.74	.79
5"	.22	.275	.33	.385	.44	.495	.55	.61	.66	.72	.77	.83
		1" SPACING 4 PIPE (ADD AS REQUIRED)										
2"	.16	.20	.24	.28	.32	.36	.40	.44	.48	.52	.56	.60
3"	.21	.263	.315	.368	.420	.473	.53	.58	.63	.68	.74	.79
4"	.22	.275	.33	.385	.44	.495	.55	.61	.66	.72	.77	.83
4 1/2"	.27	.338	.405	.473	.54	.61	.68	.74	.81	.88	.95	1.01
5"	.27	.338	.405	.473	.54	.61	.68	.74	.81	.88	.95	1.01

E-103-B

LABOR: INCLUDES PLACING AND TYING IN.

12-57

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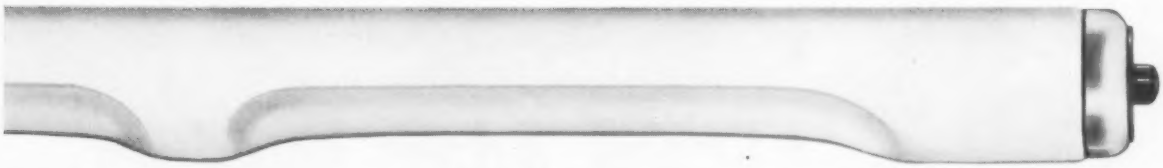
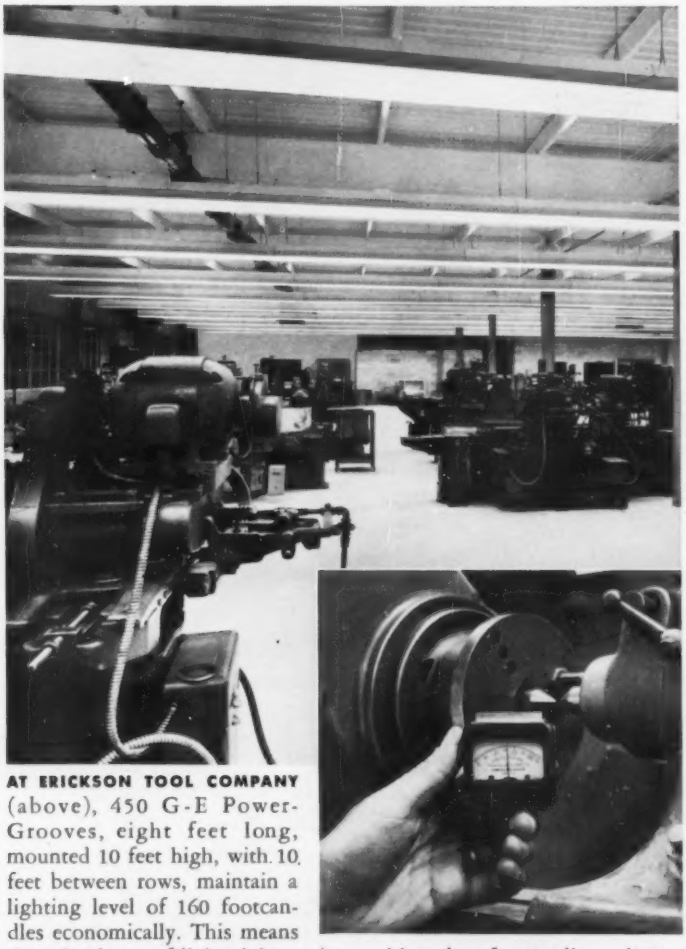


The Powerful Power-Groove!

Radical new General Electric fluorescent lamp design can give your customers higher, more economical light levels



AT ERICKSON TOOL COMPANY (above), 450 G-E Power-Grooves, eight feet long, mounted 10 feet high, with 10 feet between rows, maintain a lighting level of 160 footcandles economically. This means there is plenty of light right at the machines (see footcandle reading at right)—where extra light means extra safety, extra accuracy for workers. No supplementary lighting is needed. Powerful Power-Grooves do it all!

While plans for their new building were still in the early stages, officers from Erickson Tool Company of Cleveland, Ohio, visited the Lighting Institute—General Electric's lamp headquarters at Nela Park. There they saw the whole array of lighting methods and discussed the powerful new G-E Power-Groove Lamps.

They were shown how these revolutionary lamps provide outstanding general lighting, making it unnecessary to use supplemental lighting on individual machines (like that used by Erickson toolmakers in their old plant). They saw how powerful Power-Grooves would fill a plant with pleasant light that's easy on the eyes . . . as well as the pocketbook. The decision was made: Erickson's new plant would have G-E Power-Groove Lamps throughout!

Because G-E Power-Groove Lamps give nearly twice as much light per tube as High-Outputs—2½ times as much as 8-foot slimlines—your customers can get more light per fixture—with fewer parts to maintain. And compared to other fluorescent systems, they can save 5-20% on their initial investment.

Get the whole exciting Power-Groove story. Write General Electric Co., Large Lamp Dept. ES-127, Nela Park, Cleveland 12, Ohio. Better still, visit Nela Park and let us show you on-the-spot demonstrations of how the powerful Power-Grooves can work for your customers.

WORLD'S BRIGHTEST WORKSHOP—Now you can see powerful Power-Grooves in action . . . lighting the world's brightest workshop. It's at the G-E Lighting Institute at Nela Park. Plan to visit it and see for yourself.

Progress Is Our Most Important Product

GENERAL ELECTRIC

"Frank Adam busduct...

Interior view of plant of Aluminum Industries, Inc., Cincinnati, O., showing Frank Adam Hi-Efficiency Feeder Duct with a Shutlbrak tap off switch to plug-in duct.

Another view of interior of Aluminum Industries plant showing Frank Adam Hi-Efficiency Busduct.

That Frank Adam Busduct is an effective answer to the modern demand for a safe, efficient, economical and dependable system of power distribution, is evidenced by the following comment of B. E. Robinson, master mechanic of the Aluminum Industries, Inc., of Cincinnati, Ohio.

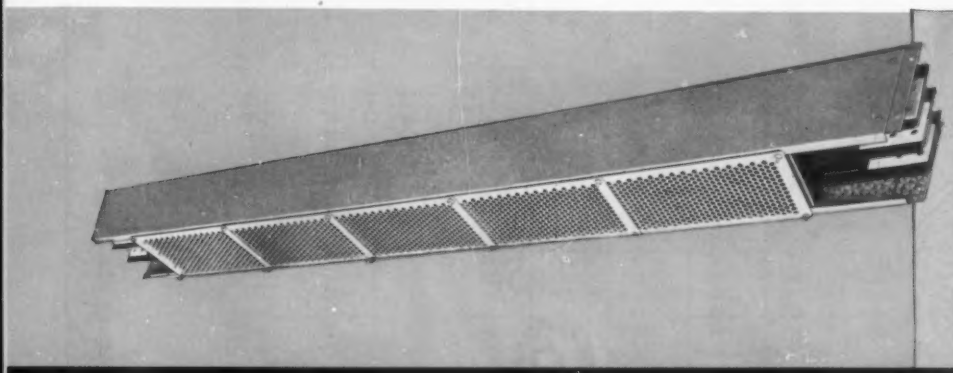
"Frank Adam Busduct," says Mr. Robinson, "certainly added to the efficiency, economy and flexibility of our plant operations.

"It has permitted us to make quick changes in plant and structural layout without disrupting production, cut maintenance costs to a minimum and enabled us to effect other economies by reducing power losses and voltage drop to a minimum.

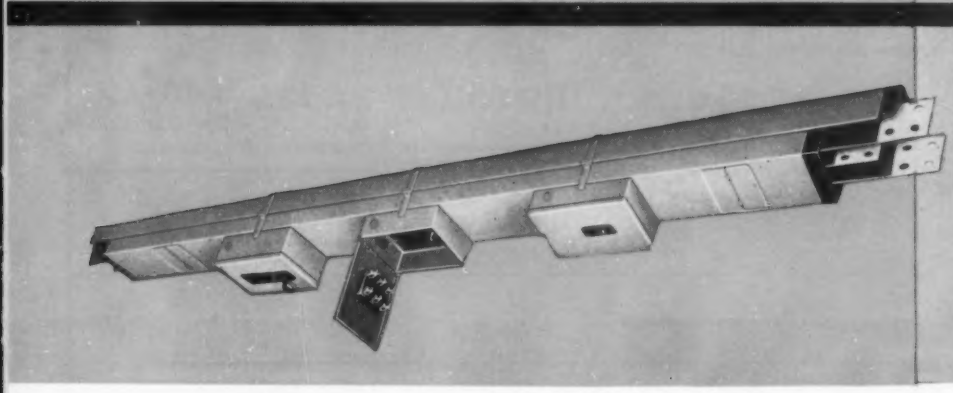
"Based on our experience, I would have no hesitancy in recommending Frank Adam Busduct to any company interested in maximum production efficiency."

Mr. Robinson's comments are typical of engineers and others concerned with the problem of increased production. These men have learned from practical experience that Frank Adam Busduct is unsurpassed for conducting current from service entrance to machine and light.

▪ added to the efficiency, economy and flexibility of our plant operations."



Ⓕ HIGH EFFICIENCY FEEDER BUSDUCT with copper or aluminum conductors is unsurpassed for conducting heavy current from service entrance to point of use. Furnished in 2, 3 and 4 conductor solid neutral types, 600 to 4000 amps



Ⓕ Powerplugin is ideal for connections of machines, closer grouping of equipment, etc. Provides plugin outlet every foot of the way.

Capacities 250 to 1500 amps, 600 volts AC or less, with fuseable or Circuit breaker plugin devices 2, 3 and 4 wire conductor, solid neutral types.

Built in standard five and ten foot lengths Frank Adam Busduct can be arranged to fit almost any electrical requirement. Sections can be run horizontal or vertical, at floor level or overhead, through tunnels under the street or through walls or roof with dust-resisting and rain tight construction for special installation.

For complete details contact your nearest Ⓕ representative, listed in Sweets, or write for Bulletin.

FRANK ADAM

FA

FRANK ADAM ELECTRIC COMPANY

BOX 357, MAIN P. O. • ST. LOUIS 3, MO.

makers of

busduct • panelboards • switchboards • service equipment

safety switches • load centers • Quikheter

FIBER CONDUIT BRIDGES 3" SPACING - PIPE (ADD AS REQUIRED)

CONDUIT SIZE	HRS. EACH	LABOR COST EACH INSTALLED AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
2"	.11	.138	.165	.193	.22	.248	.275	.303	.330	.358	.385	.413
3"	.16	.20	.24	.28	.32	.36	.40	.44	.48	.52	.56	.60
4"	.16	.20	.24	.28	.32	.36	.40	.44	.48	.52	.56	.60
4½"	.21	.263	.315	.368	.42	.473	.53	.58	.63	.69	.74	.79
5"	.27	.338	.405	.473	.54	.61	.68	.74	.81	.88	.95	1.01
		3" SPACING - 3 PIPE BRIDGE (ADD AS REQUIRED)										
2"	.16	.20	.24	.28	.32	.36	.40	.44	.48	.52	.56	.60
3"	.16	.20	.24	.28	.32	.36	.40	.44	.48	.52	.56	.60
4"	.21	.263	.315	.368	.42	.473	.53	.58	.63	.69	.74	.79
4½"	.21	.263	.315	.368	.42	.473	.53	.58	.63	.68	.74	.79
5"	.27	.338	.405	.473	.54	.61	.68	.74	.81	.88	.95	1.01
		3" SPACING - 4 PIPE BRIDGE (ADD AS REQUIRED)										
2"	.16	.20	.24	.28	.32	.36	.40	.44	.48	.52	.56	.60
3"	.21	.263	.315	.368	.42	.473	.53	.58	.63	.68	.74	.79
4"	.21	.263	.315	.368	.42	.473	.53	.58	.63	.68	.74	.79
4½"	.27	.338	.405	.473	.54	.61	.68	.74	.81	.88	.95	1.01
5"	.27	.338	.405	.473	.54	.61	.68	.74	.81	.88	.95	1.01

E-103-B

LABOR: Includes placing and tying in.

12-57

THREADING RIGID CONDUIT
BY HAND

PIPE SIZE	HOURS EACH	LABOR COST INSTALLED EACH AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
1/2"	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30
3/4"	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	.28	.30
1 "	.1	.125	.15	.175	.20	.225	.25	.275	.30	.325	.35	.375
1 1/4"	.12	.15	.18	.21	.24	.27	.30	.33	.36	.39	.42	.45
1 1/2"	.15	.19	.225	.26	.30	.34	.375	.41	.45	.49	.525	.56
2 "	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
2 1/2"	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
3 "	.25	.31	.38	.44	.50	.56	.63	.69	.75	.81	.88	.94
3 1/2"	.3	.375	.45	.525	.60	.675	.75	.825	.90	.975	1.05	1.13
4 "	.4	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50

E-101-B

LABOR: Above figured on intermittant operations. Add 12 minutes to set up pipe vise & tooling as required. Time includes cutting, reaming & threading only.

12-57

Electrical Estimating—III

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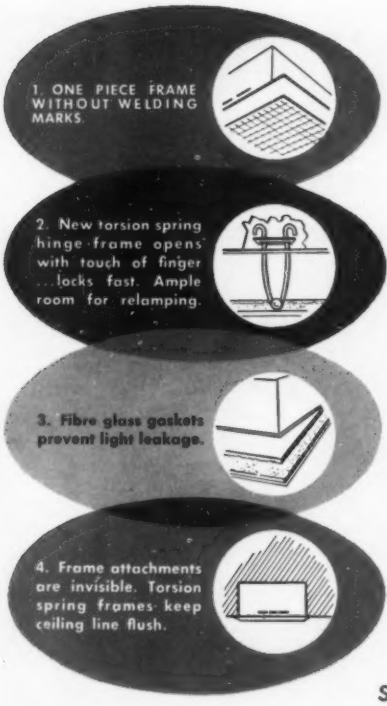
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2. New torsion spring hinge frame opens with touch of finger ...locks fast. Ample room for relamping.
3. Fibre glass gaskets prevent light leakage.
4. Frame attachments are invisible. Torsion spring frames keep ceiling line flush.

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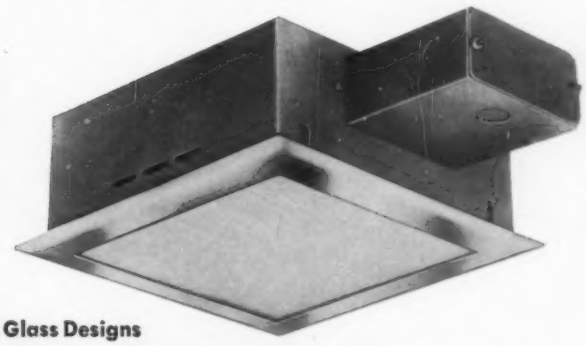

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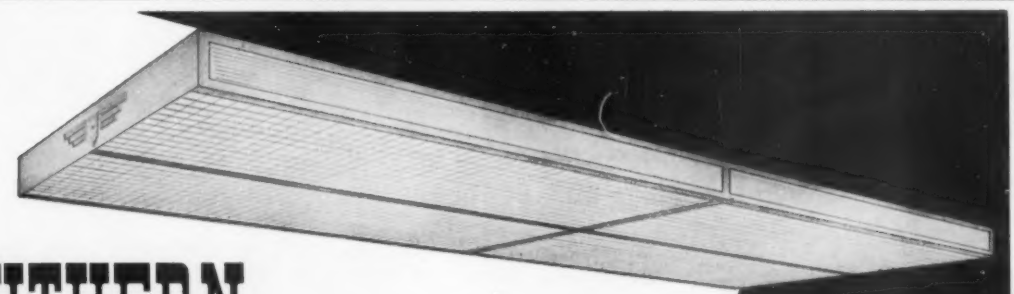

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This shallow luminaire may be used as an individual unit, in continuous rows, or arranged in various patterns. When surface mounted, the plastic side panels of ribbed, polished diffusing polystyrene illuminate the adjacent ceiling. The white translucent louver of molded 5/8" cubicles provides 42-degree shielding lengthwise and crosswise.

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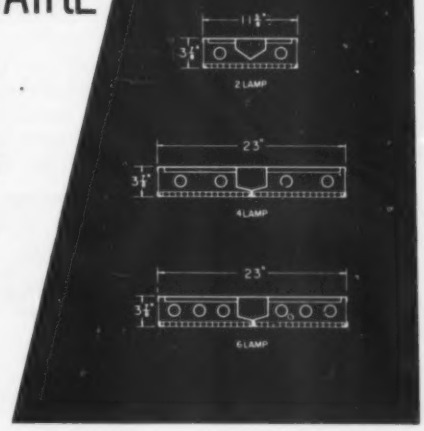
Remember, specify and satisfy with SOUTHERN fluorescent fixtures.



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ANNOUNCES the C-L-X* Sheath

The pliability of the C-L-X Sheath is limited only by the pliability of the cable it contains.

...an entirely new closed system that gives incomparable benefits in all types of cable installations

Simplex C-L-X is a Continuous Lightweight eXterior metallic sheath that is impervious to gases, chemicals and water. Its unique construction gives it a combination of properties that is unmatched by any cable system now manufactured in the United States.

C-L-X provides a completely sealed conduit — with "built-in" cable. C-L-X combines all the advantages of lead sheathed and interlocked armored cables. In addition, it has its own intrinsic qualities of great strength with extremely light weight. It is suitable for installation in trays or by clamps. C-L-X can be used aerially or buried directly in the ground. Its pliability permits ease of installation.

For more than a decade, this type of cable protection has given exceptional service in European installations. *Now, Simplex engineering has adapted C-L-X so that its scope of industrial applications is practically unlimited for modern American installations.* It is unequalled in situations where impermeability and durability are important.

Like all Simplex products, C-L-X is engineered for lasting quality and, therefore, *dependability*. Write for specific product data.

*(Continuous Lightweight eXterior, pronounced "Seslex")

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"the American manufacturers of transoceanic telephone cables"

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1958 EDITION

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The 1958 Electrical South Directory of Manufacturers and Their Southern and Southwestern Representatives is now available.

This helpful publication for electrical buyers in the South and Southwest includes a comprehensive listing of electrical manufacturers in alphabetical order, together with the names, addresses, and telephone numbers of their Southern and Southwestern agents. A special section of the directory lists electrical manufacturers' agents in the South and Southwest by city and state.

The tremendous enthusiasm which marked publication of previous editions of this outstanding directory for the electrical trade indicates that the 1958 edition will be sold out early in the year. Make sure that you get the copies you need by using the convenient coupon order form below.

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News of the industry

edited for Southern readers

SEWA to hold eighth Industry Day meeting

PROGRAM plans are progressing for the eighth annual "Industry Day" meeting sponsored by the Southeastern Electrical Wholesalers Association, reports M. L. Tice, executive vice-president. The meeting will be held at the Atlanta Biltmore Hotel, January 29-31, 1958.

Among those who will address wholesalers and their guests from the electrical contracting, utility, and manufacturer branches of the electrical industry will be Frank R. Widmer, Commercial Research Division of Republic Steel, Cleveland, Ohio; L. P. Pleasants, Sylvania Electric Co., Salem, Mass.; Charles H. Porter, vice-president, Anaconda Wire and Cable Co., New York City; George D. Hynes, vice-president, General Cable Corp., New York City; and Carl S. Menger, vice-president, Triangle Conduit and Cable Co., New Brunswick, N. J.

A special feature of the program will be the Southern Breakfast Party given by the Southeastern Electrical Manufacturers Representatives Club.

Cecil J. Matthews, of Matthews Electric Supply Co., Birmingham, and president of SEWA, will preside over the sessions of the "Industry Day" meeting. Other officers of the association are Russell S. Hughes, Hughes Supply, Inc., Orlando, vice-president; and Fred H. Dendy, Electrical Wholesalers, Inc., Atlanta, treasurer.

Regional association of contractors formed

DELEGATES from seven cities in three southwestern states met in Dallas recently to formally organize a regional organization, "The Associated Independent Electrical Contractors of America."

The thirty-seven delegates in attendance at the conference represented independent electrical contractors from New Orleans, La.; Oklahoma City and Tulsa, Okla.; and Dallas, Fort Worth, Houston, and San Antonio, Texas.

Myer Frauman, president of the United Electrical Contractors Association, of Dallas, served as temporary chairman of the two-day meeting. The conference agreed on the following objectives for the new association:

To acquire and disseminate valuable information for its members and the electrical trade.

To elevate the standards of the electrical industry.

To promote general welfare of the electrical industry and those dependent upon it.

To endeavor to ascertain the value and intention of pending legislation affecting electrical industry at local, state, and national level, and to pass on to membership an unbiased opinion.

To vigorously oppose unfair trade practices or acts or implications tending to discriminate against any electrical contractor regardless of affiliations.

And to oppose and expose persons found causing loss of confidence in the electrical industry.

A group of five or more qualified electrical contractors under one organization name of their choosing who are not affiliated with a similar regional association may qualify for membership. Their organization may be closed shop, open shop or a combination of both.

Executive headquarters mailing address for the "Associated Independent Electrical Contractors of America" will be P. O. Box 4915, Dallas, Texas.

A. W. (Woody) Norwood, of

Executive committee members at the recent organizational meeting of the Associated Independent Electrical Contractors of America are, from left to right, Myer Frauman, acting conference chairman; and Officers-Elect: E. D. (Dagwood) Ferguson, secretary-treasurer; A. W. (Woody) Norwood, president, (all of the United Electrical Contractors Association, Dallas); and Paul E. Pitcock (Independent Electrical Contractors Association, Tulsa), vice-president.

A group of convention delegates representing independent electrical contractors' associations from seven major southwestern cities are shown here between discussion sessions at the Statler Hotel in Dallas.

Dallas, was elected president of the new organization and installed at a banquet on the closing day of the meeting with forty-six delegates and wives in attendance. Paul E. Pitcock, of Tulsa, was elected vice-president, and E. D. Ferguson will serve as secretary-treasurer. The board of directors will include one board member from each local association.

Houston utility to double capacity

PLANS to install an additional 1,510,000 kilowatts of capacity in the next three years, which will double its present capacity of 1,421,000, was announced by W. A. Parish, president of the Houston Lighting and Power Co.

Speaking at a luncheon meeting of the New York Security Analysts, Mr. Parish said the schedule calls for installation of 400,000 kilowatts in 1958; 385,000 in 1959; 440,000 in 1960, and 285,000 for January, 1961, which will give the company a 16 per cent reserve position. He noted that 25 per cent of the company's revenues from larger customers are now received from the chemical industry, which represented only 14 per cent of the load ten years ago.

"In order to take care of our growth, which has been greater than we anticipated, we have had to spend a lot of money and for the next several years at least, we are going to have to spend a great deal more money annually than we have ever spent in the past," the utility executive said.

Contractors advised to stress service

"THE FUTURE of electrical contractors is in serving their customers so well that they cannot afford to not have the contractors serve them."

This admonition, coupled with a strong plea for more creative selling, was presented to a national conference of electrical contractors by Arthur E. Bertke of the Bertke Electric Co., Cincinnati, Ohio. Mr. Bertke is national chairman of the NECA Marketing Service Division.

Speaking at a two-day meeting of leading electrical contractors held at the General Electric Lamp Division's Lighting Institute, Nela Park, Cleveland, Bertke warned the group that passive service to customers was not enough to secure a fair share of the expanding market.

"Creative selling is absolutely necessary to be successful," Bertke said. "You cannot take a passive

THE MAGAZINE

For

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If you aren't a subscriber, become one—or, if your subscription is about to lapse, renew it! The small expense will be returned to you many times in the thousands of pages of valuable information that will be yours for the next three years.

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attitude and do only those things that are self evident. You must be alert to the future needs of your customers. You must study his business so that you can intelligently advise him."

He pointed out that the consumption of electricity has doubled every ten years for the last fifty years and cited a forecast which predicts that it will again double in the next seven years.

Some of this doubling, he said, results from new construction, but a good share of it will take place among present customers who are modernizing their lighting or expanding their operations. Present customers stand in need of reliable advice and extra service.

Bertke also advised the group to place a fair value on their services and then get the job by selling service, not by meeting a competitor's price.

"Meeting an inferior competitor's price," Bertke warned, "merely encourages him to go still lower the next time and causes a downward spiral of pricing.

"We have accepted the false principle that the low bidder is entitled to the job for too long," he said. "Fight vigorously for the acceptance of quality."

Royal Electric holds national sales meeting

NEW PRODUCTS, new packaging and merchandising, new production facilities and improved marketing were studied thoroughly at a three-day national sales meeting of Royal Electric Corp., Pawtucket, R. I., manufacturers of wire, cable, cord sets, fuses and wiring devices.

Seventy-six salesmen from Royal's nationwide organization of 34 sales agency offices, and 30 headquarters office and plant personnel, met to tour the company's Pawtucket and Woonsocket plants and to be brought up to date on the production advances accomplished on the new line of wiring devices recently introduced.

Royal president R. A. Riesman was chairman of the entire meeting, and presided at the product sessions during which speakers included Samuel B. Alperin, vice-president and sales operations manager, Sheldon Green, assistant plant manager, Leroy C. Laig, head of the cord set department, and Lester F. Wilkinson, assistant sales manager, industrial division, all of the Pawtucket plant, and Leonard Broder, general manager of the Woonsocket, R. I., wiring device division.

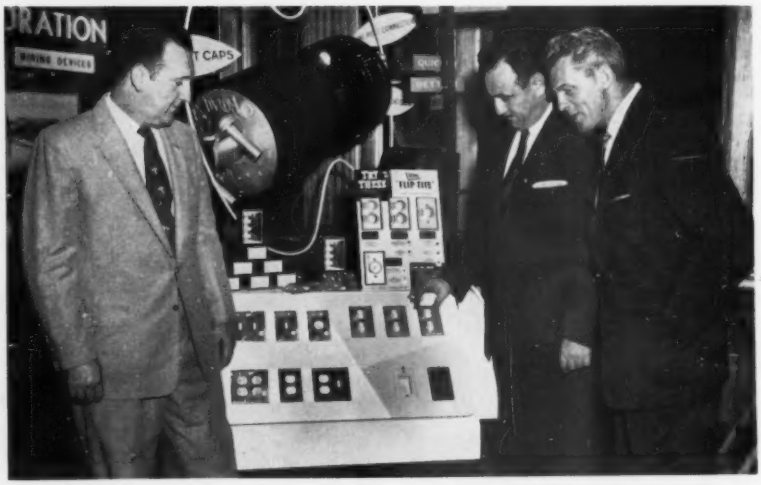
Jules P. Goldsmith, marketing manager, spoke on marketing and distribution, and marketing sessions were highlighted by talks by members of the sales organization; Cary Chapman, of Cary Chapman & Co., Atlanta, B. R. Bray, of Eckert-Lloyd Company, Los Angeles, Ralph James, of Northwestern Agencies, Inc., Seattle, Jack Roberts, of Nuro Company, San Antonio, and William Swanberg, of Fay-Sullivan, Inc., Syracuse.

Bureau canvass reveals promotion material use

A SPECIAL CANVASS of purchasers to determine the use of its commercial wiring promotional materials has just been completed by the National Wiring Bureau. Results indicate that the materials purchased have already been put to use by 33 per cent of the respondents.

Those who have not yet put the material to use mentioned the following procedure plans: to release it this fall through local adequate wiring bureaus; to mail it to their "Today's Business" list; to distribute it to customers; to use it this fall when the local rush of commercial and domestic building is down (local electrical contractors now being too busy to follow up on any leads); to send cards, followed up with personal calls and ordering

Attending the national sales conference of Royal Electric Company in Pawtucket, R. I., are representatives of Cary Chapman & Co., of Atlanta. Left to right are Robin R. Redmond, Robert W. Chapman, C. R. Taylor, W. H. Maxwell, Jr., R. E. Barnes, Eric K. Wadsworth, D. C. Scivley, Jr., F. A. Zeller, Cary W. Chapman, D. W. Oldham and G. W. Allen.



Left to right, Jesse T. Wright, S. R. Suchman and Ray Lane, sales agents for Suchman & Coulter, Inc., of Miami, Fla., observe a display of new wiring devices at Royal Electric's annual sales conference.

of Powerating sheets if interest warrants.

The material, where used, was distributed as follows: 37 per cent by direct sales approach; 27 per cent through direct mail; 27 per cent through meetings; 9 per cent through shows.

Fully 25 per cent said they had reached new prospects through use of the material. Opinion as to its effectiveness was about evenly divided among the various sales folders prepared.

The plan book, "Let's Talk Business," was considered helpful in pointing out ways and means of planning promotion, sparking ideas for a program, and in helping sell management in starting a program. While some advocated continuing the book in its present form until more field experience is gained, others suggested furnishing more details on materials and on suggested programs.

In answer to the final query, "What would you most like to have the bureau do next in this field?" these recommendations were contributed: cover more types of businesses; offer suggested newspaper promotions and ads; offer more mailing pieces; tell what contractors can do to help the program; continue to analyze the commercial market, so as to build up acceptance of adequate wiring in commercial establishments.

AIEE winter meeting calls for two hotels

BECAUSE OF the number of technical sessions and committee meetings, the American Institute of Electrical Engineers will utilize both the Hotel Statler and the Sheraton-McAlpin Hotel for its 1958 Winter General Meeting in New York City which will be held February 3-7, it has been announced by D. M. Quick, general chairman.

Forty-two committees of the six technical divisions and several general committees of the worldwide institute are sponsoring 96 sessions and symposia, in what is described as the most comprehensive survey of electrical engineering developments since AIEE was formed 74 years ago. More than 5,000 are expected to attend.

Additionally, a speaker of national prominence will address the opening general session and presentation of the 1957 Edison Medal will be made to an outstanding engineer for exceptional service to the profession. Announcement of nominations of 1958-59 officers also will be made during the meeting. Some twenty inspection trips to industrial sites in the metro-

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PORTABLE HEATERS

Model	Cat. No.	Volts	Suggested Price
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New DESIGN
Modern Streamlined

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Tutone Driftwood

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100% SAFE!

The reason these heaters are so safe to use anywhere from attic to basement is because of the completely sealed-in, cast-aluminum heating element—an Electromode exclusive feature. There are no open wires and no glowing coils, and there is no danger of fire, shock or burn. Equipped with an automatic safety switch and quiet heavy duty motor.

INSTANT HEAT—WHEREVER NEEDED

These powerful new heaters give abundant fan-circulated heat for big rooms, safely and quickly. Enable the family to use the whole house, anytime. Equipped with a 6-foot cord and plug and convenient carrying handle. Built-in thermostat provides automatic room temperature control.

Ideal for use in basement game room, work shop, laundry; expansion attic; cottage; garage; big hard-to-heat rooms.

Electromode's full line consists of heaters for home, farm, industry—in portable, suspension, and wall-type models.

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politan area also are in the planning stage.

In the Power Division, the rotating machinery and transmission and distribution committees have scheduled five sessions each. The transformer committee plans four sessions; three are scheduled by the insulated conductors committee; the system engineering committee will present individual sessions as well as joint sessions with the committees on power generation and computing devices; the power generation, power system communications and protective devices committees also are planning one or more sessions and the substation and switchgear committees will have a joint session in addition to individual sessions.

Committees in the Communication Division have announced a joint session on data communications and telegraph systems; radio communication and television and aural broadcasting, and telegraph systems and wire communications. Other sessions planned by the division will include communication switching and communication theory.

In the Industry Division there will be sessions on industrial power rectifiers and systems, industrial control, electrical welding, mining and metal industry, petroleum industry and four sessions each on feedback control and the chemical industry and electric heating.

Committees in the Science and Electronics Division are organizing sessions on nucleonics, basic sciences, dielectrics, electrical techniques in medicine and biology, electronics, magnetic amplifiers, and metallic rectifiers.

The General Applications Division is sponsoring sessions on marine transportation, domestic applications and production and application of light.

The Instrumentation Division will have sessions on electronics, high frequency instruments and recording and controlling instruments.

Among the sessions sponsored by general committees are those on research and safety.

Manufacturers appoint new representatives

ALLIS-CHALMERS Manufacturing Co. has named the Sikeston Motor and Transformer Co., Inc., of Sikeston, Mo., as agency for feeder voltage regulators and distributor for motors and transformers in counties in Southeastern Missouri, Southern Illinois, Northwestern Tennessee and Southwestern Kentucky.

Allis-Chalmers has also named two new agencies in Oklahoma City, Okla., for its feeder voltage regulators. The Electric Supply of Oklahoma, Inc., 113 NE 10th St., is serving as an agency for feeder voltage regulators in twenty-three Oklahoma counties. The Southwest Electric Co., 2617 South Agnew St., is covering nine counties in the state.

* * *

PASS AND SEYMOUR, Inc., manufacturer of electrical wiring devices, recently announced the appointment of William C. Robertson

W. C. Robertson

of Hollywood, Fla., as sales representative for their newly created Florida-South Georgia territory.

* * *

TEVCO Insulated Wire, of Burbank, Calif., has appointed Jules J. Dreyfuss Sons, of Atlanta, Miami, and New Orleans, to sell their complete line of wiring components in the southeastern states.

* * *

SIERRA ELECTRIC Corporation recently appointed the Jim Randall Company, of Dallas, as their sales

Jim Randall

representative in the state of Texas. Associated with Jim Randall, who has covered the electrical field in Texas since 1926, are Ralph Ryan and Howard Kennedy, of Houston.

A NEW ELECTRICAL manufacturers' agency business has been organized by G. M. Hogshead with headquarters at 320 Lincoln St., Charlotte 3, N. C. Mr. Hogshead was formerly associated with Gene Lombardi in the same kind of business.

Effective November 1, the Hogshead Company was named representative for Western Insulated Wire Co. in North Carolina and South Carolina; for Midwest Electric Mfg. Co., in western North Carolina and South Carolina; and for Economy Fuse & Mfg. Co. in western North Carolina, South Carolina, and Savannah, Ga.

Facilities consolidated by Dallas representatives

CURTIS MUSGROVE Company, a firm of manufacturers agents for electrical transmission and distribution equipment, has consolidated its Dallas headquarters operations in a 12,000-square-foot brick building in Brook Hollow Industrial District. Both warehouse and office facilities, formerly at separate locations, are now included in the Brook Hollow building.

The Musgrove Company, in business in Dallas since 1932, furnishes equipment to the electric utility industry in Texas and Oklahoma. The firm is a partnership of Curtis Musgrove and his son, Curtis Musgrove, Jr.

The building, at 8909 Sovereign Row, has a red face brick front accented with red Roman brick insets. There are two truck-loading doors, paved off-street loading and turning apron, and paved off-street parking for approximately 30 automobiles. Two rail loading doors open on a Rock Island rail spur. The office area, 1,300 square feet, has complete year-round air conditioning.

In addition to its Dallas headquarters, the Musgrove Company maintains district offices in Fort Worth, San Antonio and Tulsa, and both a warehouse and district office in Houston.

Oil circuit recloser movie available

IMPROVED distribution system reliability and conductor protection is the theme of a motion picture prepared to acquaint operating personnel with the features of the Type W oil circuit recloser.

The fast-clearing high-capacity recloser has opened many new application possibilities. The 2½-cycle clearing time and 200-mva interrupting capacity are important features that have made

readers through advertisements in national magazines. Electrical con-

new applications practicable. Flexibility in operating sequences and a complete line of accessories help achieve coordination with fuses, other reclosers, and circuit breakers.

A showing of the 16-mm, 28-minute, sound and color movie can be arranged by writing Line Material Industries, McGraw Edison Co., Milwaukee 1, Wis., or contacting a local representative of the company.

Asheville firm renews 55th year lamp contract

DISTINCTION of holding the oldest lamp contract in force with General Electric Lamp Department goes to Electric Supply Company of Asheville, Inc. Dating back to the turn of the century, the relationship between these two organizations has just been renewed for its 55th year. The occasion was marked by a dinner given by Glenn E. Park, manager of the Lamp Department's Carolina Sales District, honoring William Farr, chairman of the board of the Asheville, N. C., electrical wholesaling company.

1958 plans announced for Housepower Program

PLANS for the electric industry's Housepower program for 1958 have been announced by E. O. George, chairman of the wiring promotion committee of Edison Electric Institute.

Mr. George, who is also vice-president of The Detroit Edison Co., outlined two major promotions for the 1958 Housepower program at a press conference, and reviewed progress of the program to date, which has as its long-term goal the modernization of wiring in an estimated 20,000,000 American homes.

A $100,000 contest will be launched for the spring, as the first of the 1958 promotions, Mr. George said. Starting during National Electrical Week (Feb. 9-15) the contest will have as its theme "Write a Caption for this Cartoon." The cartoon will show a low Housepower situation. Advertisements in major consumer publications will announce and publicize the contest and the Housepower program for '58.

A twenty-page, two-color consumer booklet, "How to Plan for Better Living with Housepower" will form the nucleus of the second promotion, scheduled for the fall, the committee chairman said. The booklet will be offered free to

SAFE!
SURE!
and
SO EASY!

IDEAL

CRIMP CONNECTORS
with the
"Wrap-Cap"*
THE UNIQUE DIAPER-WRAP
INSULATOR

Patented, No. RE23649 and other patents pending.

ONLY 2 PARTS

Crimp sleeve with IDEAL Electricians Pliers.

Apply "Wrap-Cap" and pull tabbed cap between wires and over ends.

Sleeve and "Wrap-Cap" fully approved for general use (600 V.) in branch circuit and fixture wiring.

No other crimp connector ever like it for simplicity and safety! Anyone who can use a pliers can make this vise-tight joint in seconds! Gives you a perfect, pre-fabricated insulating job every time — *all around* and *between* the wires. Puncture proof, with double thickness over wire ends. Steel sleeve is cadmium plated — vibration proof, non-crystallizing. "Wrap-Cap" is made of same long-lived vinyl material used on TW wire.

NO EXTRA TOOL NEEDED

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Please send catalog data on IDEAL Crimp Connectors and Electricians Pliers.

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on costly "down-time" many man-

Dates Ahead

Edison Electric Institute, Industrial Relations Committee, Mayflower Hotel, Washington, D. C., Jan. 16-17, 1958.

Southeastern Electrical Wholesalers Assn., 8th Annual Industry Day Meeting, Biltmore Hotel, Atlanta, Ga., Jan. 29-31, 1958. M. L. Tice, Exec. Vice-Pres., P. O. Box 176, Ben Hill Station, Atlanta 11, Ga.

American Institute of Electrical Engineers, Winter General Meeting, Hotel Statler, New York, N. Y., Feb. 2-7, 1958.

Edison Electric Institute, Electrical Equipment Committee, Dayton Biltmore Hotel, Dayton, Ohio, Feb. 10-11, 1958.

Edison Electric Institute, Transmission and Distribution Committee, Lord Baltimore Hotel, Baltimore, Md., Feb. 11-12, 1958.

Edison Electric Institute, Meter and Service Committee, Sheraton Hotel, Philadelphia, Pa., Feb. 17-19, 1958.

National Adequate Wiring Conference, Chicago, Ill., Feb. 20-21, 1958.

Southern Safety Conference and Exposition, Peabody Hotel, Memphis, Tenn., March 2-4, 1958.

American Institute of Electrical Engineers, Textile Conference, Georgia Institute of Technology, Atlanta, Ga., March 13-14, 1958.

Edison Electric Institute, 24th Annual Sales Conference, Edgewater Beach Hotel, Chicago, Ill., March 24-27, 1958.

Oklahoma Utilities Association, Annual Convention, Biltmore Hotel, Oklahoma City, March 27-28, 1958.

American Institute of Electrical Engineers, Pulp and Paper Conference, North Carolina State College, Raleigh, N. C., March 27-29, 1958.

American Institute of Electrical Engineers, Southwest District Meeting, Tulsa, Okla., March 31-April 2, 1958.

Illuminating Engineering Society, East Central Regional Conference, Richmond, Va., April 14-15, 1958.

Illuminating Engineering Society, South Central and Southeastern Joint Regional Conference, Lafayette, Ark., April 24-25, 1958.

American Institute of Electrical Engineers, Middle Eastern District Meeting, Washington, D. C., April 28-30, 1958.

Illuminating Engineering Society, Southwestern Regional Conference, Shreveport, La., April 28-29, 1958.

American Institute of Electrical Engineers, Middle Eastern District Meeting, Washington, D. C., April 28-30, 1958.

Illuminating Engineering Society, Midwestern Regional Conference, Kansas City, Mo., May 1-2, 1958.

Edison Electric Institute, Electrical Equipment Committee, Radisson Hotel, Minneapolis, Minn., May 12-13, 1958.

American Institute of Electrical Engineers, East Central District Meeting, Huntington, W. Va., May 13-15, 1958.

National Telemetering Conference, (AIEE-ISA-IAS), Lord Baltimore Hotel, Baltimore, Md., June 2-4, 1958.

National Association of Electrical Distributors, 50th Annual Convention, Civic Auditorium, San Francisco, June 9-13, 1958.

American Institute of Electrical Engineers, Summer General Meeting, Buffalo, N. Y., June 22-27, 1958.

American Institute of Electrical Engineers, Petroleum Industry Conference, Baker Hotel, Dallas, Sept. 15-17, 1958.

Edison Electric Institute, Meter and Service Committee, Plaza and Driscoll Hotels, Corpus Christi, Texas, Sept. 22-24, 1958.

National Electrical Contractors Association, Annual Convention, Dallas, Texas, Nov. 19-22, 1958.

readers through advertisements in national magazines. Electrical contractors, dealers, and utilities will be furnished with advertising display kits to enable them to tie in their store advertising and displays with the national Housepower program.

"Sixteen months ago, the word Housepower was introduced to the American public," Mr. George commented. "Today, documented research shows that 40 per cent of American homeowners know what Housepower is and can correctly identify its meaning with adequate wiring."

Public acceptance

While Housepower is now synonymous with adequate wiring throughout the electrical industry, Mr. George pointed out that the program has done more — it has achieved real meaning at the grass roots level, where wiring modernization becomes a reality in rewired homes.

He also cited a survey of electrical manufacturers demonstrating that the Housepower program has had tangible effects in lifting the sales of their products.

The Housepower program has received tremendous support, not only from members of the electrical industry, but also from the steel, copper, glass, aluminum, and other industries, Mr. George said. He announced that certificates of recognition would be presented to 21 companies for their work in furthering the Housepower concept since January of this year.

Mr. Carl T. Bremicker, chairman of the National Wiring Bureau, and vice-president of Northern States Power Co., described the National Wiring Bureau's coordinated Housepower activity. All elements in the bureau's 1958 program will be designed to help electrical contractors, utility companies and home builders to translate the consumer demand for Housepower, created by Edison Electric Institute's national advertising, into sales of wiring modernization jobs and adequately wired homes.

Brief news notes of manufacturers

A NEW WING has been added to the plant of the Helwig Co., located at 2550 N. 30th St., Milwaukee 10, Wis., which will increase plant area by over thirty-five per cent. The first floor of the new addition accommodates their new office. The second floor is for a new "rush-order" department. Enabling the company to continue and improve their famous "one-day" service of all motor repair shop orders, this department will cut down

on costly "down-time" many manufacturing firms experience during a breakdown.

* * *

MORE THAN 650 persons toured the plant and offices during recent "open house" at the new home of the Jasper Blackburn Corp., 1525 Woodson Rd., St. Louis, Mo. The newly completed building devotes 90,000 sq. ft. for the manufacture of electrical equipment and 10,000 sq. ft. for offices, and it is designed so that it can be expanded to 220,000 sq. ft. with 24,000. sq. ft. for offices.

* * *

GROUND-BREAKING for a new plant in Niles, Ill., marks the most recent expansion of Revere Electric Mfg. Co., manufacturers of industrial and commercial outdoor lighting equipment. The new building will be erected on a ten-acre-site and will contain 110,000 sq. ft. of floor space. Manufacturing and warehousing will utilize 100,000 sq. ft. and 10,000 sq. ft. will be allotted for office space.

* * *

CURRENTLY under construction at Cleveland, Ohio, is a new research and development center for Preformed Line Products Co. The $500,000 facility will have 20,000 square feet to house testing equipment as well as engineering and executive offices. The laboratory section is already completed with the rest scheduled to be finished around the first of the year.

* * *

WESTON Electrical Instrument Corp., Newark, N. J., has announced relocation of its instrument service division in a new building at Union, N. J. The move is part of a company-wide expansion program to provide its service department with greatly enlarged and more efficient quarters; thus insuring prompt customer service.

* * *

F. CULLEN ADAMS, Southeastern Regional manager of The Bryant Electric Company announces the transfer of the Regional office from Washington, D. C., to 31 - 16th St., N.W., Atlanta 9, Georgia.

* * *

HUBBARD AND COMPANY recently announced the opening of a new warehouse and office facilities at Plano, Texas. This modern and efficient service center, covering an area of 30,000 square feet, is now stocking between 500 and 1000 tons of pole line hardware and protective equipment. The warehouse is the result of increasing demand in South for Hubbard products.

KILLARK FITTINGS

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3-WAY STRENGTH

on every job!

1 Strength in METAL
Non-rusting aluminum plus a special blending of alloys for greater malleability and resistance to shock and strain **far beyond** on-the-job needs.

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Carefully engineered for maximum performance, designed to utilize inherent metal-strength to the fullest.

3 Strength in MANUFACTURE
Die-cast under 10,000 lbs. of pressure to produce a tougher, closer-grained metal.

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BALTIMORE, 11 W. 25th St.

Killark
ELECTRIC MANUFACTURING COMPANY
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News about people

John W. Lastinger, vice-president and Valdosta division manager of the **Georgia Power Co.,** has been elected vice-president in charge of public relations and advertising with offices in Atlanta.

Mr. Lastinger attended Emory University and joined the company in

John W. Lastinger

1926. In 1950 he became president of Georgia Power and Light Co. He was elected vice-president and Valdosta division manager when the properties of the Georgia Power and Light Company were sold this year to the Georgia Power Co.

C. W. Warner becomes vice-president and Valdosta division manager for Georgia Power Co., replacing Mr. Lastinger. Mr. Warner graduated

C. W. Warner

from Alabama Polytechnic Institute and was associated with General Electric Company and the Florida Power Corporation before joining Georgia Power and Light.

Appointment of **John L. Black** as supervisor, Industrial Press Section was announced recently by **A. R. Tofte,** manager of Industries Group Advertising and Industrial Press Dept., Allis-Chalmers Manufacturing Co.

Prior to his appointment, Mr. Black worked for a number of years on Industries Group internal publications. He joined Allis-Chalmers upon graduation from Northwestern university's Medill School of Journalism, where he majored in science-editorial work.

Harllee Branch, Jr., president of the **Southern Company** has announced the election of **Clifford B. McManus** to the position of chairman of the board, and of **L. T. Smith, Jr.,** as a director for the company.

Mr. McManus succeeds Eugene A. Yates who passed away in October.

C. B. McManus

Mr. McManus was vice-chairman of the company before his election to the chairmanship. He is a former president of the Southern Company and also of the Georgia Power Company. He was associated with the Alabama Power Company in both engineering and executive capacities for several years after his graduation from Alabama Polytechnic Institute.

Mr. Smith is president of Gulf Power Company and has been connected with that company since 1926. He was previously superintendent of the northern division of Alabama Power Co., and is a graduate of Alabama Polytechnic Institute.

Walter B. Gesell has been named to direct the newly established Economics Department of **Edison Electric Institute,** it was announced recently by **Edwin Vennard,** managing director.

Mr. Gesell, who is retiring as vice-president in charge of operations for Oklahoma Gas and Electric Co., Oklahoma City, has been closely associated with the electric utility industry for more than forty years. He received a degree in mechanical engineering at the University of Wisconsin.

A. J. Haswell has been named vice-president and assistant general manager of the **Oklahoma Gas and Electric Co.,** according to an announcement by **Donald S. Kennedy,** presi-

A. J. Haswell

dent and chairman of the board of directors. In his new capacity, Mr. Haswell will coordinate the activities of the generation, engineering, construction, transmission - distribution, rate and personnel departments.

E. Winfield Harper has been named director of personnel administration

E. W. Harper

for OG&E, replacing Mr. Haswell. Mr. Harper is a veteran of twenty-one years with the company.

W. Frazier, Midwestern District manager of the **Graybar Electric Co.,** announces the appointment of **C. R. Downing, Jr.** as manager at Tulsa.

Mr. Downing started at Graybar, Tulsa as a quotation clerk 1947. In 1951 he was appointed assistant manager of supply sales, and later was promoted to manager of supply sales. From 1954 until his current appointment, he has served as both salesman and manager of supply sales.

T. R. Fuller has been named general sales manager for all divisions of the general sales department of **Thomas Industries Inc.,** according to Frederick Keller, vice-president and director of sales of the Louisville, Kentucky, company.

Mr. Fuller, who has been with the

T. R. Fuller

company for 7½ years, has been sales manager of the Lighting Division for the past 2 years.

Mr. Fuller is a graduate of the School of Commerce at the University of Wisconsin. He has held positions as advertising manager, assistant to the sales manager, assisted in product development for all divisions of the company and in 1954 was named assistant sales manager. In 1955 he was named sales manager.

The appointment of **Earl I. Dinsmore** to the post of Southwestern regional sales manager was announced recently by John A. Wright, president, of **Curtis Lighting, Inc.**

Mr. Dinsmore holds a master's de-

Earl I. Dinsmore

gree from the Harvard Graduate School of Business Administration. He joined Curtis in 1954. He previously was a sales representative for United Air Lines. His business address is 4723 N. Central Expressway, Dallas, Texas.

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Monarch
ELECTRIC CORPORATION
Jamestown, New York

P. E. McChesney has been elected vice-president of the **Arkansas Power and Light Co.** He is a veteran of forty years in the electric power and light industry and served as an ad-

P. E. McChelsney

ministrative assistant in the company's executive offices since 1951.

He was president of Capital Transportation Company prior to its sale by AP&L, and previously had served as president of Arkansas Utilities Co., and vice-president of Gulf States Utility Co.

John J. Neidhart has been named manager of application engineering at the **Miller Company,** Illuminating Division.

Mr. Neidhard is a graduate of Case Institute of Technology. He is co-author of the current IES Zonal Method of calculating lighting utilization coefficients. He is currently chairman of the IES Handbook Revision Committee.

Richard E. Raymond has been named superintendent of transmission and distribution for the **Florida Power Corporation,** according to a re-

Richard E. Raymond

cent announcement by H. K. McKean, vice-president in charge of operations. Mr. Raymond is a graduate of the University of Florida; he joined the company in 1939.

Promotions for two members of **A. B. Chance Company's** field sales staff were announced recently by **L. C. Hansen,** the company's director of marketing.

Dwight E. Argo, Southwest regional sales manager, will be transferred from Dallas, Texas to San Francisco to be regional sales manager for the eleven Western states.

Albert B. Goodall, Levittown, Pa., will be promoted from district sales

Albert B. Goodall

manager to head the Southwestern region.

Mr. Argo joined the Chance sales staff in 1941. He advanced from salesman to senior salesman to district sales manager and, in 1954, was promoted to regional manager.

Mr. Goodall has been with Chance since 1948, starting as a trainee salesman. He worked as a sales representative, and as application engineer in the Centralia office, before becoming a district sales manager in 1956.

Two new positions in the headquarters advertising department of **Westinghouse Electric Corporation** have been recently announced.

Paul J. Bridwell has been named manager of industrial products advertising, and **J. A. Cunningham,** manager, utility products advertising.

Responsibilities of Mr. Bridwell's will include the advertising and sales promotion programs of the motor and control, gearing, industrial heating, and manufacturing and repair divisions, and the material manufacturing and industrial department.

Mr. Cunningham's field will cover the transformer, meter, switchgear, and transportation and generator divisions, and the steam and electric utility department.

Square D Company, manufacturer of electrical distribution and control equipment, has named **Lawrence G. Maechtlen** as first vice-president, effective immediately, it was announced by Gordon Patterson, president.

A director and vice-president of Square D since 1951, Mr. Maechtlen has, for the past three years, served as manager of the company's Western Division.

Mr. Maechtlen joined Square D as a draftsman in 1926, successively becoming chief engineer, works manager, district manager, sales manager and manager of the Western Division. He is a graduate of the California Institute of Technology.

Irving P. Siegle has been appointed to pilot a new post as national sales manager for **EJS Lighting Corp.**

A newcomer to the lighting field

Irving P. Siegle

but a recognized leader in sales development and management, Mr. Siegle was previously associated with Conmar Products Corp.

Don P. Caverly has been appointed director of engineering and development of **Harvey Hubbell, Inc.**

Mr. Caverly was formerly associated with Sylvania Electric Products, Inc. Nationally recognized as an author and lecturer, he is widely known in the electrical and electronic industries. Mr. Caverly is a native of Massachusetts. He received his engineering training at the University of Maine, and later attended Boston University, College of Business Administration.

George A. Waterman has joined **Olin Mathieson Chemical Corporation** as director of product sales and engineering for Olin Aluminum, according to an announcement by **Sam Gurley, Jr.,** vice-president of Aluminum Division sales.

Mr. Waterman will have direct responsibility for the direction and coordination of product and industrial sales, and engineering service. He received his masters degree from the University of Chicago and was formerly connected with Kaiser Aluminum and Chemical Sales, Inc., and Revere Copper and Brass Inc.

The **Buffalo Forge Company** has announced the promotion of **J. Barrie Graham** to the position of director of research.

Mr. Graham came with the company in 1953 and is a graduate of Carnegie Institute of Technology. He was previously employed by the University of California in atomic energy research.

Richard D. Madison has been appointed consulting engineer to the company. A graduate of Rose Polytechnic Institute, Mr. Madison joined Buffalo in 1919.

Announcement has been made by the **Sunbeam Lighting Company** of the appointment of **Rex L. Zinn** to the position of lighting consultant at the firm's new Gary, Indiana plant.

Mr. Zinn will serve as a key sales and engineering link to the 37 Eastern states. He comes to Sunbeam from a twelve-year association in commercial and industrial lighting with a large utility company.

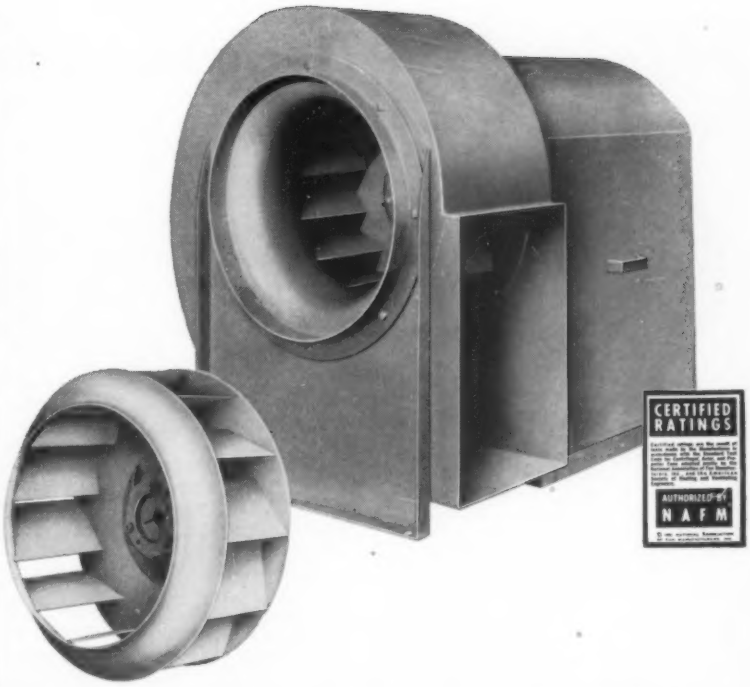
Charles L. Smith, secretary-treasurer of the International Association of Electrical Inspectors and electrical field engineer for NFPA, passed away November 12 at the Veterans Research Hospital in Chicago.

Mr. Smith's long experience in the electrical industry dated from 1920. He started to work as an electrical helper at the age of 12 and obtained his journeyman's license when only 17. He completed his grade and high school education and studied electrical engineering at Detroit Institute of Technology, where in his last year or two he served as an assistant instructor in physics and mathematics. He served for a time as Chief Petty Officer in the U. S. Sea Bees, and served the City of Detroit in several capacities including chief electrical inspector.

Mr. Smith was appointed secretary of IAEI in 1948. In the ensuing nine years the association progressed rapidly with a membership increase of nearly 300 per cent.

Lyman Coleman Reed, founder and chairman of the board of **Reed Unit-Fans, Inc.** and Lyman C. Reed, Inc., died recently at his home in Waynesville, North Carolina. A life-long resident of New Orleans, Mr. Reed retired some years ago; and, at that time, moved to Waynesville.

Mr. Reed was a pioneer and former president of the Electrical Association of New Orleans, a former national president of the Propeller Fan Manufacturers Association—as well as an inventor and holder of many patents. He is recognized as one of the leading pioneers of the electrical industry in New Orleans.



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Peerless Backward Curve Blowers are all Peerless—motor and all. We control the entire production of this versatile blower, from drawing board to finished product. We guarantee it unconditionally for quiet, trouble-free operation.

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Made entirely by Peerless; arc-welded housings and frames; wheels designed for quieter operation; dynamically balanced.

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Matching wheel cone accurately fits spun venturi for quieter, smoother air movement. All welded construction; material 16 ga. or over. Each unit air tested, and rated to assure certified PFMA ratings. Fits standard curbs.

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- Lashes one, two or three cables at one time
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Technical books

for the electrical man

Utility lighting

"Lighting Outdoor Locations of Central Station Properties." Published by the Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y., 16 pages, 50¢.

Of special interest to those concerned with lighting of properties within electric utilities themselves is this third in a series of such booklets covering various aspects of utility property lighting which have been prepared by the I.E.S. Committee on Lighting of Central Station Properties.

As explained in the foreword of "Lighting Outdoor Locations of Central Station Properties," the variety of seeing problems and conditions encountered in generating and substation areas is not typical of work areas in general.

The new report is fully illustrated with charts and diagrams as well as photographs of many typical installations. It first analyzes the various seeing tasks involved and covers general applications, describing and explaining each. One diagrammatic page is devoted to outline drawings of typical equipment showing photometric designations and distribution characteristics. Table II lists recommended levels of illumination for a number of areas within generating or substation properties. Another section concerns electrical distribution and control.

Test equipment

"1958 Test Equipment Annual," compiled by the staff of PF Reporter magazine. Published by Howard W. Sams & Co., Inc., 2201 East 46th St., Indianapolis 5, Ind., 120 pages, illustrated, $1.00.

This new annual publication will be an invaluable aid for service technicians, students, and industrial users of text equipment. It contains the most needed, the most requested information about all types of test equipment and accessories. Articles are new and current—written by the nation's foremost experts on test equipment.

Eight fact-filled sections give thorough coverage: use and selection of test equipment for color, test equipment for special applications, maintenance, test equipment methods, measurement analysis, and general information, using test equipment for troubleshooting, questions and answers, and a special product listing section.

Over 375 current instruments and accessories are featured in the product listing section. Pertinent specifications are given on all equipment, and most models are illustrated. The equipment of 44 major manufacturers sold through electronic parts distributors is represented.

Research reactors

"U. S. Research Reactors," released by the U. S. Atomic Energy Commission. Available from the Office of Technical Services, United States Department of Commerce, Washington 25, D. C., 63 pages, illustrated, $1.50.

Prepared for engineers, scientists, and administrators, this paper bound booklet is illustrated with 116 drawings, photographs, diagrams, and charts, and describes more than 30 research reactors, now in operation or under construction. The reactors are grouped according to major types. One or two examples of each are described at length as typical. Features of others are illustrated and significant data given for all.

Cost information is furnished for most of the research reactors, including analysis of the relation between the initial cost of the reactor itself and total costs incurred to make it useful.

The annual cost of operating a research reactor — items such as salaries of supervisory and operating staff, heat and utilities, health physics service, maintenance, insurance, fuel, and amortization — may range from as low as $15,000 per year for a fractional watt laboratory reactor to well over $200,000 per year for a 1000 kilowatt pool reactor. Special facilities may cost nearly as much as the reactor and entail a comparable annual operating expense.

The booklet contains chapters on light water moderated reactors (pool and tank types), heavy water moderated reactors, graphite moderated reactors, homogeneous reactors, and reactors for safety research. It also has a brief glossary of reactor terms, and a list of research reactors built, under construction, or planned in the United States, including those intended for foreign locations.

Hi-fi annual

"Hi-fi Annual and Audio Handbook," compiled by the editors of Radio and TV News. Published by Ziff-Davis, 366 Madison Ave., New York 17, N. Y. (Available on newsstands) Price, $1.

A comprehensive guide to hi-fi construction and maintenance, the Hi-Fi Annual contains complete instructions for setting up home hi-fi systems and gives detailed coverage of such topics as speakers and enclosures; purchase and installation of preamps, equalizers and tone controls; do's and don'ts of amplifiers; room acoustics; latest techniques of stereophonic sound; tape recording; transistor hi-fi; and service and improvement of hi-fi systems.

Bus conductors

"Aluminum Bus Conductors Technical Manual," prepared by Kaiser Aluminum and Chemical Sales, Inc., 919 North Michigan Ave., Chicago 11, Ill. Available free if requested on company letterhead, otherwise, $7.50; 176 pages, illustrated.

Designed as a basic guide for use in engineering conductor installations, the purpose of the book is two-fold: (1) to illustrate, describe, and classify the numerous aluminum bus bar shapes and alloys now available and (2) to assist the reader in making the most advantageous utilization of aluminum for various electrical bus bar designs and applications.

Special attention has been paid to the design of the book to enable the reader to find desired data rapidly. It is sectionalized, with a comprehensive table of contents and an index. Throughout the book, basic engineering data are presented to enable the user, by simple calculations, to easily evaluate the essential design information and thereby determine what is necessary for a specific application. Text and tables are presented in easy-to-read type.

Some of the more valuable sections include detailed discussions on fabricating processes, mechanical design, joining, installation methods, and accessories.

The chapter on fabricating deals with comparison of surface finish, strength characteristics, and dimensional tolerances imparted to the aluminum alloys through the various mill production methods.

There is detailed information on mechanical design to prove the adequacy of the proposed installation when subjected to short circuit forces and vibrational stresses.

Mechanical and fusion methods of joining are covered. Here emphasis is placed on the proper surface preparation to give low resistance and stable joints. In addition to preheating and edge preparation, four principal welding methods are discussed. A practical method of welding aluminum to copper is also explained.

Accessories commonly used for joining, supporting, tapping, and terminating bus bar, showing a wide variety of installation methods, are included. In addition, there are numerous charts, graphs, line drawings, and other illustrations throughout.

The scope of information is sufficiently broad to interest all persons engaged in the distribution and transmission of electrical power. In general, utilities managers, electrical engineers, purchasing agents, consulting engineers, electrical contractors, construction personnel, and such users of conductor as railroads, mining companies, industrial chemical companies, and refineries should find the book of practical value. With information presented, it becomes an easy matter to determine the exact size and type of aluminum conductor for any application.

Mathematics

"Mathematics for Science and Engineering," by Philip L. Alger. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y., 360 pages, $6.95.

A complete revision of *Engineering Mathematics* by the famous Charles P. Steinmetz, this book presents methods and procedures for finding, understanding, and applying the mathematical procedures best adapted to solve a particular problem. It aims to help students, teachers, and practicing engineers to use mathematics effectively by first showing the unity and simplicity of the basic mathematical ideas and then making numerical calculations easy.

Beginning with a quick review of arithmetic, it goes on through algebra, trigonometry, calculus, probability, and linear differential equations. Special emphasis is given to complex numbers, infinite series, and approximations.

Each subject derives as a natural extension of earlier topics, making for clarity and easy use of various mathematical methods valuable as interrelated and supporting "tools" in performing different tasks.

The New
GOLDEN GATE
in Miami Beach
transforms
a vacation into
an event.

And for the finest in transformer value, this famous resort uses MARCUS for power and lighting distribution. You, too, can guarantee trouble-free performance and a real vacation from maintenance and replacement problems by specifying MARCUS for your next transformer installation.

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MARCUS
TRANSFORMER CO., Inc.
RAHWAY, NEW JERSEY

A COMPLETE LINE OF DRY TYPE AND LIQUID-FILLED TRANSFORMERS

New products

Multiple compartment reel for on-the-job paralleling

Two NEW multiple compartment reels are now offered by the Weber Electric Manufacturing Co., 15224 Kercheval Ave., Detroit, Mich.

These reels are ideal for those who must parallel wire on the job. They're designed to turn by themselves on roller stands stored inside the reel. These stands (furnished) allow the reels to "feed the different sized wires" as required.

These multiple reels are ideally suited for those hard to get at jobs where wire handling in the past has been almost impossible. Hundreds of man hours have been saved by contractors using these Wemco multiple compartment reels.

They are also designed to be used on portable reel carts, also manufactured in a complete variety by Weber Electric Manufacturing Co.

Two Models are available: model MCR-3 is a compartment reel capable of handling 400 ft. of 500 MCM wire in each compartment; model MCR-4 is a 4 compartment reel capable of handling more than 300 ft. of 500 MCM wire in each compartment.

For additional data, ask for item P-1216, using the coupon on page 105.

Hammerless tool expands anchors at uniform depth

AN EXPANDER hammerless anchor setting tool developed by Arro Expansion Bolt Co., North Boone Ave., Marion, Ohio, is ideal for setting anchors in concrete block, cinder block, tile, etc., where the holes extend all the way through the masonry or where the fragile bottoms will not withstand the hammer blows of a regular setting punch. It is an excellent tool for expanding a series of anchors at a uniform depth.

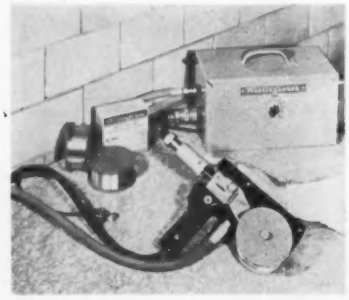
Use of the Expander makes installation of anchors fast and easy and gives the work a neat, trim appearance. Simply screw the anchor onto the threaded stud, insert in the hole to proper depth, then turn the "T" handle until the anchor is fully expanded. The tool comes in a range of sizes up to and including the ¼".

For additional data, ask for item P-1217, using the coupon on page 105.

Portable handgun designed for inert gas welding

A HIGHLY PORTABLE handgun and control for welding aluminum and other metals has been developed by the Westinghouse Arc Welding Dept., Box 2278, Pittsburgh, Pa.

Able to handle filler wire down to 0.020 inches, it is the first fully portable gun capable of welding light gauge metals; it is particularly effective in welding aluminum. It is also the first commercially available gun to mount an integral motor-driven wire drive and an integral wire supply. Two models will be available;



one will handle filler wire in 1/50 inch (0.020) to 3/64 inch diameters; the other is for wire in 3/64 to 1/16 inch diameters.

Weighing less than four pounds when loaded with one pound of filler wire, the gun and its control are easily hand carried into severely

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☐ Send C.O.D. I'll pay postman $7.75 plus C.O.D. fee on delivery.

(December 1957)

cramped quarters or into overhead structures. In repetitive operations, the gun causes very little operator fatigue.

Tests in the field—principally shipyards—indicate travel speeds for horizontal fillets will average 22 inches per minute with 1/16-inch filler wire. In production operations speed of the gun permits light semi-finished assemblies to be welded with a minimum of heating and distortion.

Design SP-1 and SP-2 guns was made possible by the very recent development of a suitable high-torque air-cooled d-c motor. Mounted in the handle, the motor drives a knurled feed roll that pulls filler wire through nylon bushings from a fiber reel at the rear of the gun.

Since filler wire is pushed only from the feed roll to the nozzle tip of the gun this drive system eliminates the burn back and other difficulties which can occur when small wire is driven to a gun over an appreciable distance. Wire speed approximates 700 inches per minute in the SA-120 model. A push button in the gun handle enables the operator to inch the filler wire when desired.

Other gun characteristics include a deadman's trigger, a shield protecting the wire supply and gun mechanism from overhead spatter, replaceable contact tube, and a heat flow inhibitor that restricts heating to the forepart of the gun. A new nozzle design provides excellent arc shielding with argon flowing at 35 cubic feet per hour.

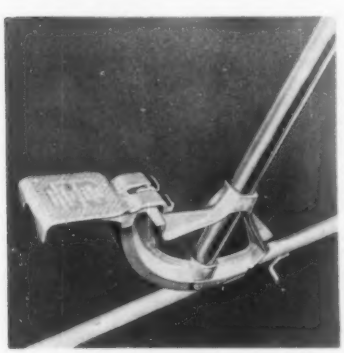
For additional data, ask for item P-1218, using the coupon on page 105.

Portable one-piece conduit bending tool

THE LATEST ADDITION to the Powr Jack line of portable Redege Benfield Benders is the PJ100 manufactured by National Electric Products Corp., Gateway Center, Pittsburg, Pa. It is designed to bend ¾ inch Sherarduct and other types of rigid steel conduit, as well as one-inch Xduct Junior metallic tubing.

The two position foot treadle booster step provides the means for constant, heavy foot leverage to assure smooth, true radius bends.

Like other models of the Redege Benfield Bender, the new PJ100 is competitively priced and serves to further eliminate the need for bulky bench-mounted bending equipment.



The new PJ100 is made of the same special analysis pearlitic malleable iron as the previously introduced models. It is finished in aluminum paint, with bright red symbols for precision bending. For safety, the tool is pre-stressed at the factory to a pressure of 16 tons and is guaranteed for five years of field service.

In addition to the two position, foot-treadle booster step, other features of the PJ100 "Redege" Benfield Bender include an integral back pusher to true up and straighten bends, and a safety collar for handle thread protection. The hook portion of the bender is equipped with outrigger stabilizers to provide firm balance.

For additional data, ask for item P-1219, using the coupon on page 105.

Three sets of dies and threads used on pipe and bolt machine

THE SPEED-O-MATIC pipe and bolt machine, manufactured by Beaver Pipe Tools, Inc., Warren, Ohio, features a new Universal-type die head which has three sets of high-speed steel dies and threads from ½" to 2".

The new Beaver S-4 Speed-O-Matic uses one Universal die head and three sets of duo-type dies (½" x ¾") (1" x 1¼") and (1½" x 2"). Duo-type and mono-type die heads are also available for this machine.

Cutoff, die heads and reamer are all pivot mounted and swing out of the way when not needed. A special oiling tube directs cutting oil right to the threading dies. Oil shuts off automatically when tube is moved out of position.

For additional data, ask for item P-1220, using the coupon on page 105.

Mobile ladder truck gives 16 foot reach

A HIGH-LADDER maintenance truck, the HL-1, developed by Rol-Away Truck Mfg. Co., Inc., 6143 SE Foster Rd., Portland, Oregon, has been added to the firm's line of more than 70 different production models of specialized materials-handling, non-powered trucks.

The HL-1 is a compact and mobile unit which can be extended to give safe working footing 8'-3" off the ground, enabling a practical reach to 16', yet when telescoped is low enough to pass through standard 6'-8" doorways.

The ladder-truck is stable and solid in its extended settings with ladder extensions being locked in place by double, independent locks which can only be released by the operator using one hand on each simultaneously.

For additional data, ask for item P-1221, using the coupon on page 105.

Shear cutting plier never needs sharpening

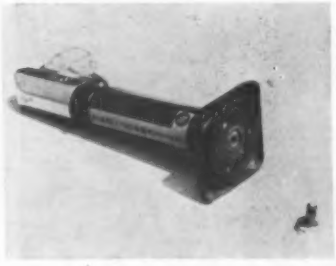
A SHEAR CUTTING oblique plier, No. 207-5-C, has been introduced by Mathias Klein and Sons, 7200 McCormick Rd., Chicago 45, Ill. The plier is 5½" long and the shear cutting blade will cut dead soft or extremely hard wire. Blades may be replaced; hence, the plier never needs sharpening. Regular cutting knives in the nose add to the usefulness and a coil spring keeps the jaws apart ready for instant use.

For additional data, ask for item P-1222, using the coupon on page 105.

Power fastening guard reduces concrete chipping

CLEANER and more efficient fastening into concrete with powder-actuated tools is being made possible by the use of the Spall Reducer Guard now being manufactured by the Ramset Fastening System, Division of Olin Mathieson Chemical Corp., 12117 Berea Rd., Cleveland 11, Ohio.

The guard can be used on either



the Ramset Duo-Jobmaster or the Ramset Super-Power tool. It is four inches square, weighs two pounds.

More acceptable work is made possible because the surface about the fastening remains relatively unmarred. Extra penetration into cement was achieved because the Spall Reducer Guard compressed the area around the point of penetration. Even though the spall created by powder-actuated fastenings does not lessen the holding power or quality of the fastenings, the guard will improve the appearance of the surface.

The guard can be installed in a few simple steps. First, the barrel cap of the powder-actuated tool is removed. Next the standard guard is taken off and replaced with the Spall Reducer Guard. Last, the barrel cap is affixed.

For additional data, ask for item P-1223, using the coupon on page 105.

Lead alloy core used in masonry screw anchors

THE UNIVERSAL masonry screw anchors manufactured by the Rawplug Co., of New Rochelle, N. Y., have recently been improved through the use of an especially developed lead alloy used in the core of the "Rawplugs."

This improved core provides more effective lubrication for faster installation and prevents fibers from being cut by screw threads. There is no change in the fiber jute construction which has made Rawplug the type of anchor that can be used in any material and, at the same time, gives it the ability to absorb continuous shock and vibration.

For additional data, ask for item P-1224, using the coupon on page 105.

Rotary-scale multi-range 300-volt scale Amprobe

A SNAP-AROUND volt-ammeter has been added to the Amprobe line of Pyramic Instrument Corp., Lynbrook, New Jersey.

Although it incorporates all the features of the popular RS-1, the RS-2 instrument differs from its prototype in that the 600-volt scale has been replaced by a 300-volt scale.

This basic change was made to provide greater accuracy for the ever-increasing number of appliance servicemen and troubleshooters who work with 220-volts every day.

In addition to the 300-volt range, the RS-2 amprobe has a 150-volt range and four current ranges (5 amps, 15 amps, 40 amps, and 100 amps) each on a separate and distinct scale.

A built-in, recessed range selector permits selection of any one range with just a flick of the thumb. Since only one current scale or voltage scale is visible at any time, speed of reading is increased and chance of error is minimized.

Other features include a magnifying-glass covered dial; a longer needle sweep; a pointer-lock to lock the needle in place when taking a reading in a difficult location, simple bayonet voltage leads that lock-in at bottom for quick connecting, impact-proof case that won't chip or crack with non-slip ribbing that gives it a firm pistol-grip, advanced printed circuit construction and shielded core magnet movement that mean trouble-free operation and longer service life.

The Amprobe RS-2 can be used for current measurement without cutting conductors. It is a convenient instrument for balancing circuits, tracing faults and grounds, as an aid in estimating new or revised distribution circuits, diagnosing operating troubles without shutting down equipment or premises, etc.

For additional data, ask for item P-1225, using the coupon on page 105.

Table clamps designed for vertical filing equipment

THE PLAN HOLD Corp., 5204 Chakemco St., South Gate, Calif., makers of vertical filing equipment, has announced the availability of their aluminum table clamps. These clamps

are specially designed to hold a fully loaded vertical filing device in place while leafing through sheets. No tools or fasteners of any kind are required to place or remove a Plan Hold device from its secure position within the table clamps.

For additional data, ask for item P-1226, using the coupon on page 105.

Simple record system prevents tool loss

AN EASY WAY to keep small tools from "disappearing" is offered by UARCO, Inc., 141 West Jackson Blvd., Chicago, Ill.

Tool loss frequently becomes a big problem simply because record keeping systems get so complicated that they break down. Instead of ledger books, cross indexes, and what not, the company suggests a tool loan form that is easy to fill out and easy to file.

The form designed by UARCO has space for only five entries: the name and serial number of the tool, the name of the worker who borrows it, the date of borrowing and the date the borrower promises to return it.

The form can be either in duplicate or triplicate, depending on the needs of the company. Normally, the original is filed according to date in the tool room, while the duplicate goes with the tool to remind the user that he is charged with it. If desired, the third copy can be sent to the accounting department to keep a record of the tool's use, life, and cost.

After the form is written, a turn of the handle on the register ejects

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two copies and locks the file copy in a compartment. The system saves the tool storekeeper the bother of inserting carbons and sorting out copies.

"There are two problems in tool control," UARCO explained. "One is loss of small, general purpose tools such as wrenches and hammers. The second is accurate cost accounting for special cutting, boring, shaping, and other tools used in various manufacturing processes. The simplified tool register provides control over both problems without turning the tool room into a records library."

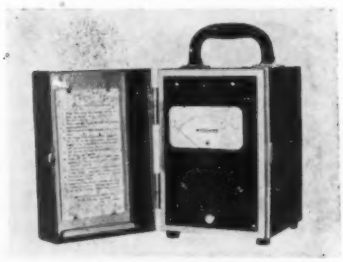
For additional data, ask for item P-1227, using the coupon on page 105.

Accurate resistance tests from 1 to 50,000 megohms

THE COMPLETE REDESIGN of the Model 250 Vibrotest insulation resistance tester has been announced by Associated Research, Inc., 3758 West Belmont Ave., Chicago 18, Ill.

The new circuitry of Model 250 for accurate resistance measurements from 1 to 50,000 megohms now provides these features:

Four overlapping ranges for excellent scale spread on easy-to-read



4½" meter. Center scale values are approximately 2, 20, 200 and 2000 megohms.

Operation is simplified with but two calibrating controls, two push buttons and a range switch.

Assured calibration is achieved through unique circuit design employing standard commercial tubes and a meter tracking control for easy matching of meter and metering circuit with original accuracy when tube is replaced.

500 v test potential is regulated from four standard voltage regulator tubes. Test potential is maintained constant throughout full four ranges of instrument.

For additional data, ask for item P-1228, using the coupon on page 105.

Two connectors added to Scotchlok series

TWO NEW color-coded, pre-insulated spring-type wire connectors have been added to the 3M line of "Scotchlok" brand electrical connectors making possible more than 400 wire combinations using only three connector sizes, according to Minnesota Mining and Manufacturing Co., 900 Bush Ave., St. Paul, Minn.

Called the "Scotchlok" brand type Y (yellow) and type B (blue) connectors, the two additions are a fixture connector (type Y) and a heavy duty connector (type B). With the existing type R (red) connector, the three sizes will accommodate AWG wire sizes from No. 6 to No. 18 in over 400 combinations. Three-color coding makes selection simple.

The type Y connector will splice solid or stranded wires from No. 12 through No. 18; the type R, No. 10 through No. 16 and the type B, No. 6 through No. 12.

For additional data, ask for item P-1229, using the coupon on page 105.

Industrial arc welder for on-the-job use

A HAND PORTABLE industrial arc welder of 200 ampere output at fifty per cent duty cycle has been introduced by Brennen, Bucci and Weber, Inc., of 262 Mott St., New York 12, N. Y.

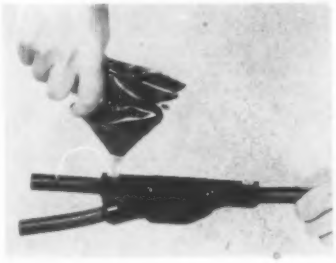
Weighing only 75 lbs. the model 200B is fan cooled for production use and it is equipped with a thermal overload switch to prevent transformer burnout. The welder employs a new exclusive ultra high efficiency Transoidal transformer enabling Model 200B to operate on 110 or 220 volts, and perform the work of a conventional arc welder four to five times its size and weighing three times as much.

This unit will weld steel 1½" thick and will cut steel ¼" thick and is particularly suitable where the welding machine must be brought to the work.

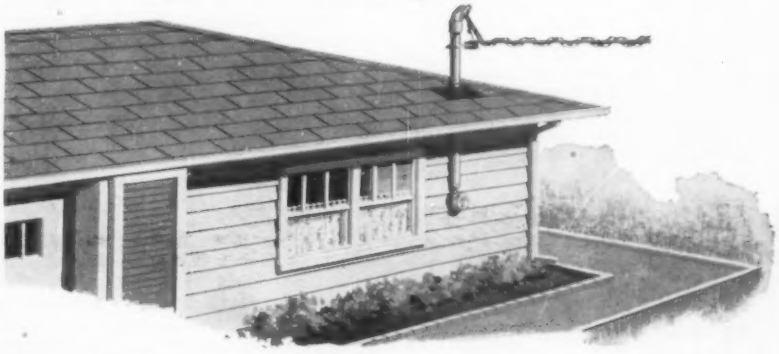
For additional data, ask for item P-1230, using the coupon on page 105.

Splicing kit for "Y" resin splices

EMBEDDING tap or branch splices in epoxy resin is now possible using a new splicing kit added to the "Scotch-



SYNROFLASHING *protects this roof from moisture leakage . . . mast vibration damage*



All Blackhawk service entrance mast kits feature this new synroflashing unit. It's a neoprene roof flashing unit that absorbs mast vibrations in the collar area. The mast can't work loose, damage shingles or give moisture a place to seep in.

Synroflashing is weather proof and weather resistant. Won't crack, peel or rot no matter what the atmospheric conditions. Synroflashing units on the Blackhawk Service Entrance Mast will give long years of dependable, trouble-free performance. Units are easily installed. They simply slip over the pipe and are pushed down to the roof. Shingles fit over it easily. Synroflashing units are available for 2" and 2½" pipe.

Blackhawk service entrance masts, with Blackhawk's famous Slip-Fitter head and new Synroflashing, can be sold as complete kits or as separate fittings.

Blackhawk Industries, Dubuque, Iowa

Where the new ideas come from

cast" brand resin splice line by Minnesota Mining and Manufacturing Co., 900 Bush Ave., St. Paul, Minn.

Using the new kit, "Y" splices can be insulated in the field in less than 10 minutes. Once a splice has been cast, it is permanently encased in a block of insulating resin which will remain solid and water-tight despite aging, heat and pressure.

The new kit has been used to splice underground cables feeding airport lighting systems and street lights as well as secondary utility circuits, overhead splices, signal systems and municipal lighting systems.

Designated the "Scotchcast" splicing kit 82-B1, the new kit consists of a two-piece plastic mold which snaps together around the wire, two plastic spouts for pouring the resin into the mold, strips of sealing tape for the mold joints and a "Unipak" container of epoxy resin.

The 82-B1 will accommodate wires ranging from ¼-inch to ⅝-inch at the outside diameter.

For additional data, ask for item P-1231, using the coupon on page 105.

Right angle conduit hanger with built-in live tension

THE CONDUIT pipe hanger now being offered by the Ramco Manufacturing Co., 540 Westfield Ave., W., Roselle Park, New Jersey, presents a new concept in right angle pipe fastenings.

This new type hanger retains constant effective clamping tension by the spring action designed into the saddle. This feature is the safety plus factor and makes this hanger ideal for heavy duty industrial applications.

The hanger can be used with standard pipe or rigid steel conduit for mounting on structural flanges up to ⅞" thick. Each hanger is furnished complete with standard electro galvanized steel U-Bolt and nuts assembled ready for use. Available in ⅜" to 2" pipe size.

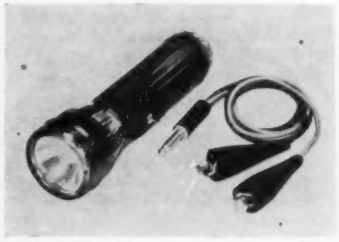
For additional data, ask for item P-1232, using the coupon on page 105.

Flashlight doubles as continuity checker

A CONTINUITY CHECKER designed as a flashlight has been made available by the Sittler Corp., 18 North Ada St., Chicago 7, Ill. It can be used as a flashlight or a circuit tester.

Regular flashlight batteries will provide sufficient power for the testing of electrical circuits, fuses, cords, low voltage lamps, motor windings, coils and other such electrical components. It comes with a removable test lead 30 inches long that plugs into place quickly and easily.

The other end is equipped with two alligator clips that provide simplified testing. Dead circuits can



be tested with the test leads, and the flashlight makes it an even more handy means of searching the dark recesses of electrical equipment.

This flashlight type continuity tester is made by the Sittler Corporation, manufacturers of a complete line of voltage testing equipment, power cables and wire, electrical maintenance hardware and portable spot welders.

For additional data, ask for item P-1233, using the coupon on page 105.

Reel brake provides dependable pay-out

A TIME and labor-saving cable-reel trailer accessory which assures a steady pay-out of cable, wire and strand as it is required is being offered by the Utility Tool and Body Co., Inc., of Clintonville, Wis.

The cable reel brake consists of a brake drum with shaft, brake band and adjusting nut, anchor to hold brake band in position and a clamp to make the spindle rotate with the cable reel.

In operation, tightening the adjusting nut on the brake band gives the desired braking effect permitting the cable, wire or strand to be paid out without danger of the reel unwinding too fast and without requiring the constant attention of one of the men in the cable-placing crew.

For additional data, ask for item P-1234 using the coupon on page 105.

Portable drafting equipment can be carried in briefcase

A PORTABLE drafting machine, so compact that it can be folded jackknife-style to fit in the pocket when detached from its drawing board, has just been introduced for use in office, home, classroom, workshop and in the field by David Miller & Associates, Box 572, Beverly Hills, Calif.

Called "Draftette," the precision instrument, in its new design, is now

available attached to a portable drawing board that fits easily into a briefcase. The unit takes the place of T-square, ruler, protractor and triangles. It is suggested for use wherever drawing, drafting, sketching and designing with high accuracy is required.

"Draftette" is of all aluminum construction, anodized jet black with gleaming white-filled numbers and letters of the scale and 180-degree protractor. Use of aluminum accents the lightness, long life and dimensional stability of the unit.

The new complete "Draftette," with 10 x 13 drawing board, sells for $5.95; with 11 x 17 board, $6.50 (weight - 2 lbs.); with 20 x 26 board, $18.95 (weight - 3½ lbs.).

For additional data, ask for item P-1235, using the coupon on page 105.

Magnetic insert finder for underfloor distribution

AN EXTREMELY SENSITIVE and accurate magnetic insert finder for steel underfloor distribution systems has been announced by General Electric's Conduit Products Dept., 1285 Boston Ave., Bridgeport 2, Conn.

This finder has been designed to locate concrete-buried steel duct inserts in existing underfloor distribution systems when additional floor outlets are to be installed.

The finder, trimly styled and compact in design, is made of brass with a durable black-crackle finish. Proximity of the duct and insert is detected by a strong permanent Alnico magnet housed in the center of the finder, and direction is indicated by

two bisecting red and white hands which pivot inside the glass-covered circular base.

Four small recessed lights at the top of the finder allow the operator to determine the precise center of the insert. These lights, which are turned on by means of a miniature push-button switch at the top of the hand-grip, automatically go out as the finder approaches the center of the insert.

Dead center is indicated when all lights are out. Power for lights and switch is supplied by a battery inside the hand-grip.

For additional data, ask for item P-1236, using the coupon on page 105.

Free bulletins

available to our readers

Standardized motor control centers are thoroughly discussed in a thirty-one page booklet now available from **Cutler-Hammer, Inc.,** 315 North 12th St., Milwaukee 11, Wis.

For additional data, ask for item B-1237, using the coupon on page 105.

A new 12-page Bulletin S7 presenting information about Sta-Kon pressure **wire joints, terminals and connectors** for all wire sizes from #22 - 250 MCM has been issued by **The Thomas & Betts Co.,** 36 Butler St., Elizabeth, New Jersey.

For additional data, ask for item B-1238, using the coupon on page 105.

Fuse clips and fuse cutouts are described in a new brochure available from the **Multi Electric Mfg. Co.,** 4219 West Lake St., Chicago 24, Ill. Sizes, physical properties, and electrical capacities of the Multi fuse clips and fuse cutouts are shown.

For additional data, ask for item B-1239, using the coupon on page 105.

A new catalog with index sheets is available from the **Light and Power Utilities Corp.,** 1035 Firestone Blvd., Memphis, Tenn., which contains complete specifications for their **fluorescent lighting fixtures** line.

For additional data, ask for item B-1240, using the coupon on page 105.

A new four-page illustrated folder describing **fluorescent ballasts** for plastic signs and other outdoor non-weatherproof service has been released by **Sola Electric Co.,** 4633 W. 16th Street, Chicago 50, Illinois.

For additional data, ask for item B-1241, using the coupon on page 105.

A new catalog which incorporates the company's complete line of **industrial wiring devices** and **explosion-proof products** is available from the **Ralco Manufacturing Co.,** 123 North Albany Ave., Chicago 12, Ill.

For additional data, ask for item B-1242, using the coupon on page 105.

The new catalog of the **O. Z. Electrical Manufacturing Co., Inc.,** Brooklyn 17, N. Y., details their line of interlocked armor cable terminators, cable supports, and splicing sleeves.

For additional data, ask for item B-1263, using the coupon on page 105.

Motor starters and contactors in sizes 4, 5 and 6 (Type 425), 50 to 400 hp, is described in a new 12-page bulletin released by **Allis-Chalmers Manufacturing Co.,** 938 South 70th St., Milwaukee 1, Wis.

Designed to assure full rated capacity, maximum motor protection, longer life and easy maintenance, these starters and contractors have been applied to practically all types of drives including pumps, crushers, blowers, fans, screens and furnace controls.

For additional data, ask for item B-1243, using the coupon on page 105.

New 36-page Catalog 57 describes full line of **electrical fittings,** cable racks and wiring specialties for contractors, public utilities and industrial plants which are available from the **M & W Manufacturing Co., Inc.,** East Palestine, Ohio.

Illustrates installation details and pictures more than 92 different products including newest additions to the line. Complete with latest prices, sizes and types of fittings in various metals.

For additional data, ask for item B-1244, using the coupon on page 105.

The **York-Hoover Corp.,** York, Pa., has announced availability of a new bulletin describing their Ranger **hydraulic derrick** for heavy duty line work.

Advantages include the hydraulic pressure digger for normal and tough spot digging, combination hydraulic and mechanical winch drive, hydraulic self-storing jacks, built-in generator for electric power tools, and rugged body construction design for tough usage, safety and comfort.

For additional data, ask for item B-1245, using the coupon on page 105.

Distribution of an eight-page catalog describing their line of **residential lighting fixtures** has been announced by the **Project Fixture Mfg. Corp.,** 55 Ongley St., Rockville Centre, N. Y. Styles and designs range in period from continental elegance to functionally modern. More than twenty new styles are being introduced.

For additional data, ask for item B-1246, using the coupon on page 105.

Static switching systems is the subject of a twelve-page bulletin recently made available by the **General Electric Co.,** Schenectady 5, N. Y.

It provides revised, up-to-date in-

Introducing
THE LATEST ADDITIONS
TO THE ACF
FAMILY OF FITTINGS

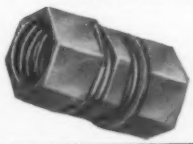
CLAMP-ON ENTRANCE CAPS

for both "E. M. T." & Heavy wall Conduit Sizes
¾"-1"-1 ¼"-1 ½"-2"

"E. M. T." CONNECTORS

ALL SIZES from ½"-2"

"E. M. T." COUPLINGS



ALL SIZES from ½"-2"

INSULATING BUSHINGS

ALL SIZES from ½"-6"

SERVICE CABLE PLATES

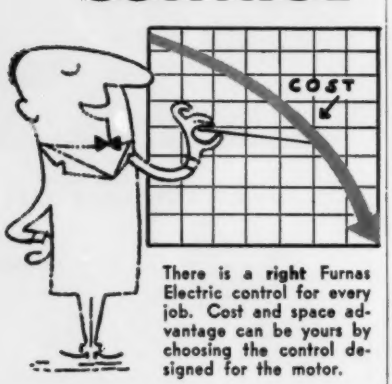
For 2/3 SEU and SEA
For 1" "E. M. T."

Write For Catalog And Latest Price Sheets

ATLANTIC CONDUIT FITTINGS COMPANY
BOSTON, MASSACHUSETTS

SAVE!

WITH THE RIGHT CONTROL

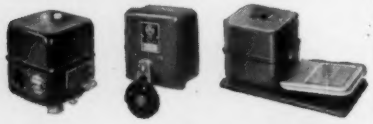


There is a **right** Furnas Electric control for every job. Cost and space advantage can be yours by choosing the control designed for the motor.

Furnas Magnetic Starters are available through Size 4 in 10, instead of the usual 5, different sizes from 1 to 100 hp. This provides "In-Between" sizes, not otherwise available, at corresponding price and space advantages.

Drum Controllers — over 1000 models available from 1 to 10 hp. for whatever application you require.

Oil Tight Push Buttons for every need. Standardization and interchangeability mean more combinations with fewer parts. Complete accessory line.



Pressure Switches | Limit Switches | Foot Switches

FURNAS 25th YEAR

For more information write for Bulletin 5411, 1064 McKee St., Batavia, Illinois.

A29

FURNAS ELECTRIC COMPANY
BATAVIA, ILLINOIS
Sales Representatives in All Principal Cities

formation on new static switching system; gives examples of uses of each of the eight basic static elements; describes operation of units; explains how various unit combinations are wedded to make up an integrated system; cites typical applications of static switching; and lists advantages of using static control in selected applications.

For additional data, ask for item B-1247, using the coupon on page 105.

The Crouse-Hinds Co., Wolf and Seventh North Sts., Syracuse, N. Y., has issued a new fifty-two page bulletin on their **lighting equipment,** covering floodlights, searchlights, aviation lighting, industrial lighting and fixture condulets. Two new items —mercury vapor floodlights and Vapor Master lighting fixtures—are also contained in the bulletin.

For additional data, ask for item B-1248, using the coupon on page 105.

A two-color pictorial publication entitled **"Full Housepower for Farm and Home"** has been published by the **Square D Co.,** 6060 Rivard St., Detroit 11, Mich.

This eight-page booklet, with simplified illustrations, shows the proper selection of electrical service entrance equipment and basic motor control devices required for homes, farms and small workshops.

For additional data, ask for item B-1249, using the coupon on page 105.

A handy reference chart for **decimal equivalents of chain discounts** has just been completed, jointly, by **Arrow Conduit and Fittings Corp.,** of Brooklyn, N. Y., and **Arrolet Corp.,** of Montgomery, Pa.

The chart shows in easy to trace columns, the decimal equivalents needed to determine cost from standard list prices. Convenient size permits them to be inserted into master catalogs or reference binders.

For additional data, ask for item B-1250, using the coupon on page 105.

A catalog of forty-seven **general interest films,** product information films, and training films is available from **Westinghouse Electric Corp.,** P. O. Box 2099, Pittsburgh 30, Pa. The 16mm sound films are for use by church, social, professional, civic, and business groups. There is also included a description of instruction courses available to electric utility companies.

For additional data, ask for item B-1251, using the coupon on page 105.

A new **lighting fixture catalog for commercial use** has just been announced by the **Moe Light** Division of Thomas Industries, Inc., 410 S. Third St., Louisville 2, Ky. The catalog includes interior and exterior decorative and utilitarian fixtures.

The catalog is profusely illustrated with full-color lighting "idea sketches" to help the designer plan distinctive installations. In addition, there are pages of technical information to help in planning well-lighted commercial interiors and exteriors.

For additional data, ask for item B-1252, using the coupon on page 105.

A comprehensive twelve-page manual on **low voltage control,** the modern method of switching lighting and appliance loads in residential, commercial and industrial installations, has been published by the **Square D Company,** 6060 Rivard St., Detroit 11, Mich.

This manual explains the flexibility, safety and versatility of this economical system and points out its advantages over conventional switching systems.

For additional data, ask for item B-1253, using the coupon on page 105.

Their new line of **vertical-break power switches** are described in a new bulletin offered by **Line Material Industries,** McGraw Edison Co., Milwaukee 1, Wis.

This bulletin enumerates the operating, electrical, and mechanical features which make PV2 switches particularly applicable to high voltage transmission circuits. PV2 switches are available in voltage ratings of 69H, 115 and 161 kv at 600 or 1200 amperes continuous current carrying capacity.

For additional data, ask for item B-1254, using the coupon on page 105.

Catalog Bulletin CR1C, which describes the Kyle Type R **oil circuit recloser** with the latest improvements, is now available from **Line Material Industries,** Milwaukee 1, Wis. New features shown in this bulletin include 5 time-current curves, adjustable reclosing time, fast resetting hydraulic pump, and improved bushing leads. A new ordering system simplifies determination of the correct catalog number for each Type R recloser.

For additional data, ask for item B-1255, using the coupon on page 105.

New 16-page catalog and selection guide covering the company's complete line of **fluorescent lamp ballasts** is now available from the **General Electric Co.,** Schenectady 5, N. Y.

The illustrated bulletin contains a listing of obsoleted ballasts and suggested replacements for such units. Publication also has list prices, data on ballast lead lengths, cross section dimensions, table on lead stripping and tinning, wiring diagrams, and electrical specifications.

For additional data, ask for item B-1256, using the coupon on page 105.

"Is the UL Label on a Ballast Really Enough for You?" is the title of a new free folder on the subject of **fluorescent lamp ballasts.** It outlines the difference between UL listing on a ballast, which covers safety, and the CBM emblem, which assures top lighting performance. The booklet is available from Certified Ballast Manufacturers, 2116 Keith Bldg., Cleveland 15, Ohio.

For additional data, ask for item B-1257, using the coupon on page 105.

How to select and apply floodlights is the subject of a new bulletin just released by the **General Electric Co.,** Schenectady 5, N. Y.

The sixteen-page booklet discusses essential features of efficient, economical floodlighting installations; provides glossary of floodlighting terms; explains the operation of floodlights; includes classification and application guide; and provides floodlight product information.

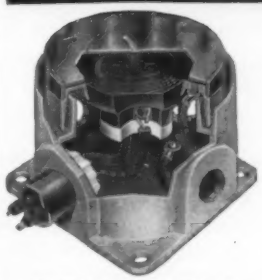
For additional data, ask for item B-1258, using the coupon on page 105.

Baseduct — new complete surface raceway electrical distribution system at the baseboard level — is reviewed in a four-page illustrated bulletin available from the manufacturer, **National Electric Products Corp.,** Pittsburgh, Pa.

The modern combination multi-out-

Latrobe PRODUCTS

FLOOR BOXES • WIRING SPECIALTIES



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All adjustable boxes are now equipped with a positive bond which makes them completely fire-proof.

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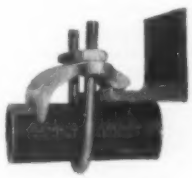
"Latrobe" Pipe or Conduit Clamp

This clamp is made with a double safety bite of case hardened tool steel. Two models—Right Angle and the Parallel support. Each model comes in 10 sizes to handle pipe or conduit ½" thru 4".



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December, 1957

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let assembly and surface raceway system is suggested for use in new construction of residential, commercial and institutional structures. It is also recommended as an economical application for rewiring existing homes and buildings.

For additional data, ask for item B-1259, using the coupon on page 105.

Industrial tachometers are discussed in a twelve-page bulletin just released by the **General Electric Co.**, Schenectady 5, N. Y.

Described are the variety of generators and indicating or recording instruments available for measuring speed of any industrial rotating equipment, including a-c and d-c tachometer generators and hand tachometers.

For additional data, ask for item B-1260, using the coupon on page 105.

Nova Sales Co., of Trenton 3, New Jersey, offers an information sheet on their Novasep **nylon anchors.** The Novasep replaces the screws, nails, plugs, expansion devices and other fasteners that are used for differing materials and equipment. The anchor works in wood, concrete block, and brick—to attach outlet boxes, light fixtures, electrical cable, pipe hangers, etc.

For additional data, ask for item B-1261, using the coupon on page 105.

D. W. Onan & Sons Inc., of Minneapolis, has revised their Blue Book of general information concerning the selection of engine driven **electric generating plants.**

Described in simple, easy-to-understand language are the three general groups of electric plants and the three types of prime mover which furnish the mechanical power for driving the generator. Cost of operation and installation of each type is discussed.

For additional data, ask for item B-1262, using the coupon on page 105.

Sectionalizing

(Continued from page 55)

for permanent faults at different circuit locations, as shown in Figure 1. If a temporary fault occurs, OCB's 787 and 790 trip and reclose in 5 seconds. The VR switches do not see this operation, and do not respond.

This sectionalizing scheme can be fitted to any application merely by coordination of VR switch trip, close, and lockout intervals with various breaker sequences. After experiencing successful operation of the first automatic sectionalizing scheme at Northgate, Tampa Electric made a second similar installation at Britton Plaza. Both shopping centers have been served continuously without an outage due to a permanent fault on the 13.8-kv circuit.

TV control

(Continued from page 59)

plants. One example in the utility industry is remote reading of a boiler gauge glass. Another, used at a Louisiana firm, is remote identification of persons entering the gate of a generating plant.

Manufacturers representatives indicated that Georgia Power is probably the first to investigate television for substation control purposes.

Code discussion

(Continued from page 45)

device similar to a duplex receptacle and it is supplied with #10 conductors, what is the maximum size overcurrent device permitted for the circuit supplying it?

ANSWER: A 20-ampere overcurrent device would be the maximum permitted by sections 2126 and 2127 because the 115 volt receptacle could be used for a general-use receptacle for plugging in floor lamps and similar portable equipment.

(Answers to ten Code test questions: 1-T; 2-F; 3-T; 4-T; 5-F; 6-c; 7-b; 8-a; 9-a; 10-c.)

Next month our discussion will continue, questions will be a little more difficult, examples of branch circuits will be demonstrated, and special questions or problems on the Code received from readers will be thrashed out and answered.

Time-saving tools

(Continued from page 25)

keep in step with anything new that will aid our men to be better, faster workers. We especially want to equip our men with the small portable electric tools that cut brick, concrete, and conduit. We supply hydraulic benders in all sizes. We have stud fastening guns, stud welders, power paint sprayers, and many other power and time-saving tools.

We encourage our electricians to suggest the purchase of new tools. Although we buy the best of the new time-savers as they are offered by manufacturers, sometimes another electrical contractor starts using something we do not have. If our men want the tool and it has real utility, we get it.

A trained worker using a new time-saving tool is a combination that the modern electrical engineer and contractor needs for the small as well as the large job.

Wiring promotion

(Continued from page 36)

thus accenting and complimenting their beautiful landscape."

Pretty good, isn't it? Safety and convenience—plus beauty.

Now this contractor is sort of a sneaky type—and a good student of psychology—and salesmanship. "After the survey—while filling out the rating sheet and estimate form—I casually laid a 15 amp circuit breaker on the table. This caught—and held—the customer's interest while I was figuring, and was a good opener for conversation."

Here is one final answer that we picked out on this point. It is an example of a contractor putting out that extra effort that so often means the difference between a sale and a "maybe later" turn down. It is also a good example of getting the customer's interest—and holding it. "He was interested in electric heating, so we followed through and got a heating engineer out and explained the heating systems to him. We also explained the cost of operation to him which he had in mind but wasn't sure. That proved to him that we were interested in his problem."

Did the salesman sell more than the customer originally had in mind: an integral part of salesmanship in selling as we practice it today.

Our electrical contractor is good at this phase of selling. This electrical contractor was called to the customer's home to wire a room air-conditioner. This is what he walked out with on his order pad:

"Floodlights for driveway and terrace; swimming pool lights; garden lighting, room cooler circuit; add lighting for furnace room; add lighting over washer, reconnected a dehumidifier; and indoor switches for outdoor Christmas lighting."

Almost 95% of the entrants indicated they did sell more than the customer originally ordered.

As a guide to the industry, we added the question: "What interested the homeowner the most; safety, improved efficiency, reserve capacity for future equipment, or convenience outlets?" Here is a breakdown of answers:

Safety—50.6%

Improved efficiency—58.4%

Reserve capacity for future equipment—48.8%

Convenience outlets—28.8%

Most entrants listed more than one feature, but we used all answers in arriving at our percentage figures.

To us, the percentage figures were rather surprising—especially the low figure "convenience outlets" chalked up. However, since we talk about efficiency in the factory, on the farm and in the homes, it is not surprising we have become efficiency conscious and this was a goal desired by the greatest majority of people having their homes rewired.

The final question on other selling techniques pointed out a few interesting answers. Here is a good one: "Pointed out the fact that real estate dealers are finding that buyers are becoming interested in how large the service is. Showed the customer that the value of the home is greater when adequately wired."

NECA convention

(Continued from page 31)

or 13.7 per cent since 1950. It has been predicted that our population shall reach around 212,000,000 by 1970. Due to the population increase it will require about 1,600,000 homes by 1970. With the increase in home starts and the electrical contractor promoting electric heating, he can rightfully look forward to years of prosperity.

Contractor promotion

"It has been said, and justly so in some cases, that the electrical contractor would not support a promotional campaign. I am happy to report to you that my company recognized the fact that housing starts were off the first of this year, and to offset this possible slump in business, we planned a sales promotion campaign. This campaign was set up on the basis that the electrical contractor would carry advertising in either newspaper, radio or TV—for which he paid 50% of the cost. The balance was shared by the electrical distributor and manufacturer. To the contractors who signed our Advertising Agreements, we offered our Baseboard Outlet Section on a no-charge basis.

"This promotion pointed out, not only the advantages of complete house heating, but also the advantages of supplemental heating, added rooms, basement and attic rooms. It tied right in with the Housepower, Adequate Wiring and Live Better Electrically programs. The Theme of the promotion was "Promote for Profit." The promotion was so successful it was necessary to discontinue it sooner than we had anticipated.

New home program

"During the coming weeks you will be hearing much about the new selling approach for homes. I refer to the Live Better Electrically — Medallion Home Program. This Medallion, when displayed on a home, certifies that it meets modern requirements for electrical living.

"Under this program, manufacturers, distributors and utilities coordinate their efforts to help design, build and sell "Medallioned" homes.

"The five basic goals of the Medallion are:

"Provide prospective home buyers with a recognized symbol of electrical excellence in new homes.

"Raise the electrical content of new home construction beyond the present minimum.

"Help builders sell homes by educating their customers to the benefits of electrical living.

"Show visitors to new homes the electrical living features that are needed in their present homes.

"Give national support to existing programs sponsored by utilities to upgrade home electrification.

"When electric heating and air-conditioning is included in these homes, they will be known as *Golden Medallion Homes*. You will be hearing much about this great promotion throughout the year 1958.

Program for action

"1. If you are not already promoting electric heating in your area, call a meeting of your local NECA Chapter, give them the facts about this great industry.

"2. Tell your employees about your plans, give them the facts and get them talking about the advantages of electric heating.

"3. In cooperation with your electric utility, electric league and distributors, present your plans in

24" - 120" SIZES!

ONLY "BUFFALO" OFFERS THIS COMPLETE LINE OF HUSKY, EFFICIENT PROPELLER FANS.

- Opens the door to many *big* jobs formerly possible only with costly fans!
- Wide choice of models for special applications!
- Package design—easy installation as ready-to-run units!
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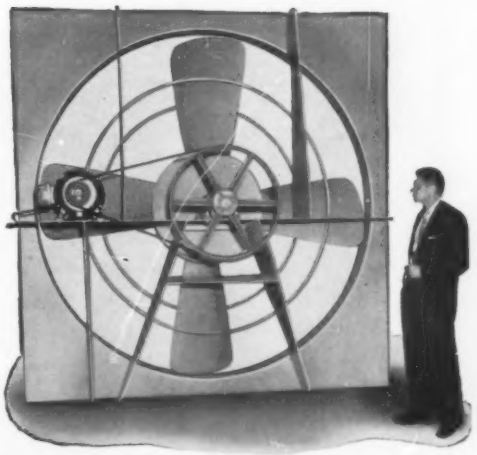

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Exclusive Electric Baseboard Heating Franchise Available. Write for your Territory Today. Reply to Box 728, **ELECTRICAL SOUTH,** 806 Peachtree St., N. E., Atlanta 8, Georgia.

a meeting consisting of architects, engineers and home builders. Call in electric heater manufacturers, working in your area, to share their experiences.

"4. Follow up these steps with a planned electric heating promotion. This should consist of newspaper, radio and TV advertising.

"5. Have a booth at your next electric or home show, displaying the electric heating products you sell. Also have displays at your electric utility company, as well as your own place of business.

"6. Be sure that the installations you make are done properly. This will result in more sales and greater profits.

"7. Get enthusiastic about electric heating. It's time for action!"

Equipment handling

(Continued from page 28)

We have in effect a tools instruction and handling program. At our meetings of supervisors every six weeks time is given the proper use of tools as well as demonstrations of new tools. Our fifty supervisors in turn hold instruction classes on the job and bring to the attention of their personnel what was learned at meetings on proper handling of tools. Misuse is called to their attention.

Carelessness that causes damage and costly repair bills is pointed out, as in a recent case where transformer oil was used in a generator necessitating a motor overhaul. Demonstrations at meetings in the shop are performed only on smaller equipment; demonstrations on large equipment are given in the field by a factory representative to our job superintendent.

Depreciation schedule

We maintain a depreciation schedule for each piece of equipment using a straight line depreciation method on the basis of years. This is a handwritten record taken yearly from our tool records indicating age of item from purchase date. This may not be the most satisfactory approach to depreciation and a different method, we hope, will be developed within the next few months.

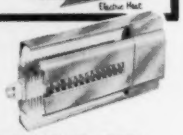
Special tools present a problem that we have yet to solve. I have

Futura... DRAMATIC NEW THIN DESIGN ...THE ULTIMATE IN HEATING COMFORT

Futura's revolutionary new slimmer, trimmer design offers you today's most modern heating system . . . the ultimate in heating comfort, convenience, economy and beauty. Although Futura is lower and thinner, it gives just as much heat per foot as larger units!

THE NEW Futura ELECTRIC BASEBOARD UNIT IS BUILT AND BACKED BY THE MAKERS OF.. Automatic ELECTRIC-RAY Electric Heat

Tomorrow is built right into Futura .....



Wattages from 750 to 2750

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Individual room thermostat either built-in or wall-mounted

ALUMINUM FIN TUBING

Inside the narrower, lower Futura unit is strong aluminum fin tubing with a solid core of ceramic surrounding the Nichrome heating element. The ceramic mass gives added heat storage. When the thermostat cuts off the current, the entire core radiates stored heat, thereby giving a steady heat with a minimum of electricity.

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in mind the special tools purchased for a particular job for which we have no further use when the job is completed. A few years ago, for example, we bought power pumps for an underwater job that have not been used since. On another occasion we spent $240 for a painter's scaffold that was not put to use again. Even the storage of such an item becomes a problem. In an airport job we had to put lines under a runway with a hydraulic pusher because the runway was not to be torn up. We have not had a job since on which we could use the hydraulic pusher.

Our method of handling equipment is the result of over thirty years of experience and is probably not the ultimate attainable. Methods change from time to time through necessity and through progress in the construction industry.

Lower job cost

(Continued from page 23)

extension ladder mounted in the truck bed is invaluable in relamping signs and flood lights, and installing new fixtures. The ladder, of course, has many additional uses, and is easily unbolted from the truck bed when not in use."

Labor costs reduced

"Labor costs on some jobs have been reduced 50 per cent to 70 per cent by the use of telescoping wheeled platform ladders. This equipment lifts an electrician, his tools and material into position easily and quickly on high-bay lighting jobs. The ladders are especially helpful in installing bus duct and continuous rows of fluorescent fixtures. The duct or fixtures can be assembled in long lengths on the floor and hoisted into position in a minimum of time."

Tennessee Armature has in recent years replaced job shacks long commonly found on larger construction jobs with specially fitted trailers. "Job shacks often cost as much as $1,500, with a salvage value of around $50," explains Mr. Hoffman. "The convenience of loading a tractor trailer with material and placing it on the job is fine, but the 100 per cent salvageability is the real talking point, for this markedly reduces our job cost."

Trucks equipped with hoists

The company's pick-up and delivery trucks are equipped with 360-degree swivel boom hoists which enable one man to load and unload heavy equipment and material right on the job site. In addition to cutting construction costs, the company's Motor Rewind and Repair Department has benefitted from providing this additional service for customers. In the shop, electric chain hoists, portable and on trolleys, speed handling of materials.

Tennessee Armature and Electric Company thoroughly examines all new tools on the market in order to keep in contact with all the latest labor-saving developments. In many instances, the cleverest labor-saving devices are created right in the shop, from suggestions by foremen and workmen on the job.

Procuring top equipment and tools and utilizing them to the fullest extent is just half the battle, however. Proper tool control and maintenance is absolutely imperative if equipment is to be most effectively utilized.

System development

As Mr. Hoffman sums it up: "We do our best to see that equipment is properly maintained; that our tools are in first class condition before being sent to a job; and that all equipment is scheduled to arrive on the job on time as required. We feel that the time invested in developing this system of company-wide cooperation has been well spent. We know we have definitely reduced our job costs through the scientific approach to the use of equipment and labor-saving tools just as we have in job management, supervision, and other phases of our business."

Economic comment

(Continued from page 4)

business and government to prevent a wholesale downturn of economic activity.

The prime question is how long will such a condition last, and how severe will be the total blow to economic activity. This question cannot be answered directly, but a great deal of the story will be told by the degree of effort that industry and labor put into a hold-the-line front to prevent wage and salary increases without consequent increased productivity. Only in this manner, then, can the problem now confronting every citizen be solved for the good of all.

... just a few stars in
ELLIOTT'S COMPLETE LINE OF FITTINGS

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ELLIOTT ELECTRIC PRODUCTS CO.
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New!
RIGID-NOB Design Provides Raised Driving Knobs -- plus A Ridge Member To Assure Easy, Straight Installations
Bright Steel • Stainless Steel • Cadmium Finish
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Pages 112, 113, 114.

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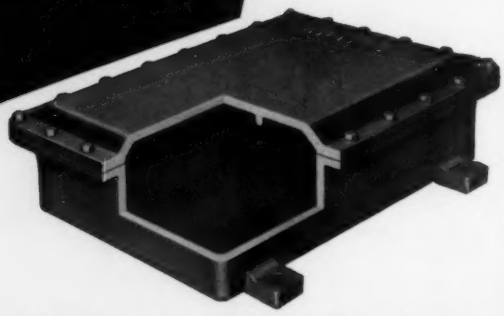

Non-sparking cast aluminum, strong and rustless. Available in a wide range of standard and special sizes.

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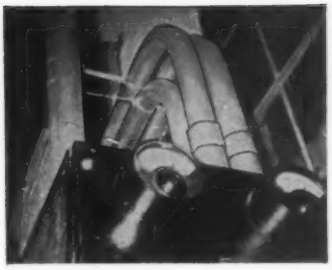

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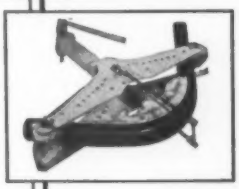

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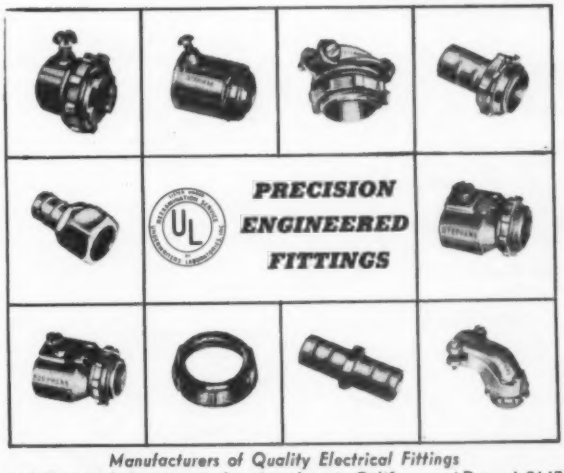

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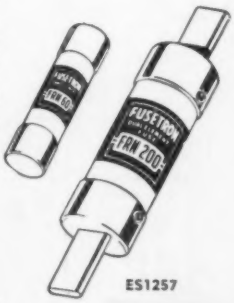

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